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ABSTRACT

The document is the fourth of a five-part series focusing in minute detail on the processes involved in the formulation of an instructional systems development (ISD) program for military interservice training that will adequately train individuals to do a particular job. Inputs, procedures, and outputs for Phase IV (Implement) and Phase V (Control) are presented. The Implement phases consist of two areas for the training of staff: (1) implement instructional management plan--providing guidelines for carrying out successful classroom management functions, and (2) conduct instruction. The Control phase consists of three steps: (1) conduct internal evaluation--analyze learner performance in the course in order to determine deficient or irrelevant instruction and thus improve its quality, (2) conduct external evaluation--assess students' on-the-job performance to determine actual performance of course graduates, and (3) revise system--make changes based on empirical data that reflect instructional deficiencies or for other reasons. A list of references, glossary, and index are included. (Author/EC)

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INTERSERVICE PROCEDURES FOR INSTRUCTIONAL SYSTEMS DEVELOPMENT

PHASE IV: IMPLEMENT

PHASE V: CONTROL

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PHASES IV AND V: IMPLEMENT AND CONTROL

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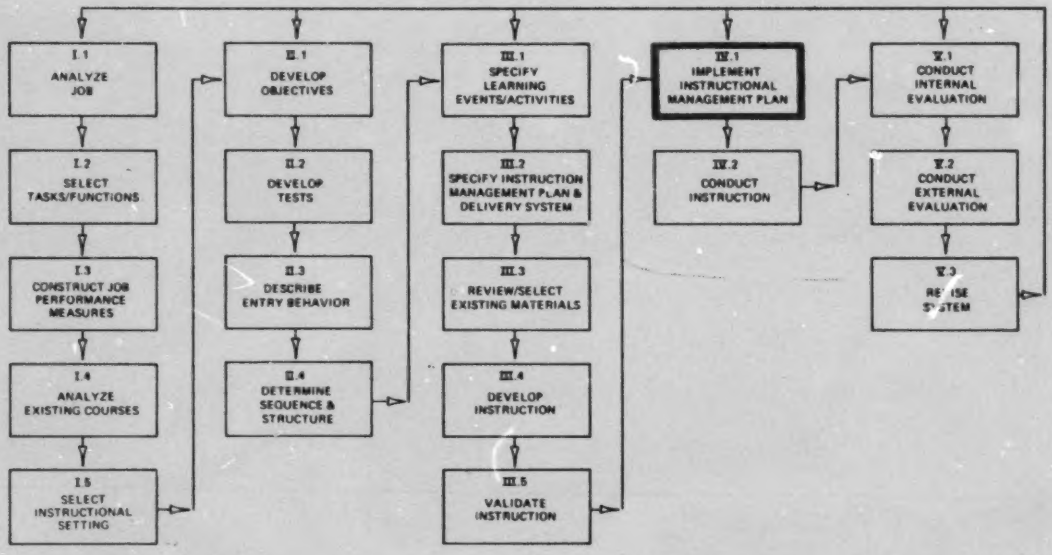
BLOCK IV.1: IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN



OVERVIEW

This block provides guidelines for carrying out the planning and classroom management functions essential to successful implementation of an instructional program. The emphasis here is on assuring that the right people are at the right place at the right time, that they know what they are supposed to do, and that they have the materials, equipment, and facilities to do it.

IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN

1.0 INTRODUCTION

Following the validation and revision cycle in Block III.5, the instructional program includes:

1. What you wish to accomplish (in the form of learning objectives),
2. How you intend to accomplish it (in the form of an instructional management plan, delivery system, and instructional materials), and
3. How you will know if you meet your objectives (in the form of tests and other appraisal instruments).

Now the time has come to:

1. Find out if the instruction and management plan work in a field setting,
2. If not, find out where they do not work, and
3. Revise until personnel and materials are developed to the point that students meet the learning objectives.

As inputs to this block, everything that has been done in Phases I, II, and III, plus the internal evaluation plan that will be discussed in Block V.1 are available. You may be surprised that you need an input from Block V.1 when you are just beginning Block IV.1. Actually, the internal evaluation discussed in Block V.1 consists of three major efforts. These are:

1. Prepare evaluation plan,
2. Collect evaluation data, and
3. Analyze evaluation data and make recommendations.

Item 1 must take place prior to beginning Phase IV of the ISD Model. Item 2 must take place during the conducting of instruction in Block IV.2. And, Item 3 cannot be completed until after Phase IV is completed.

To further complicate things, the implementation of the instructional management plan in this block begins before the conducting of instruction in the next block, but is not complete until the next block is complete. A rough idea of the time relationships between these blocks is shown in Figure IV.1. You should not assume from this that these steps in the ISD model take place only one time. If there are problems with the program, all three blocks will have to be repeated until the problems are identified and corrected.

The individuals involved in Phases I, II, and III may or may not be the instructors, supervisors, or classroom managers who conduct the instruction.

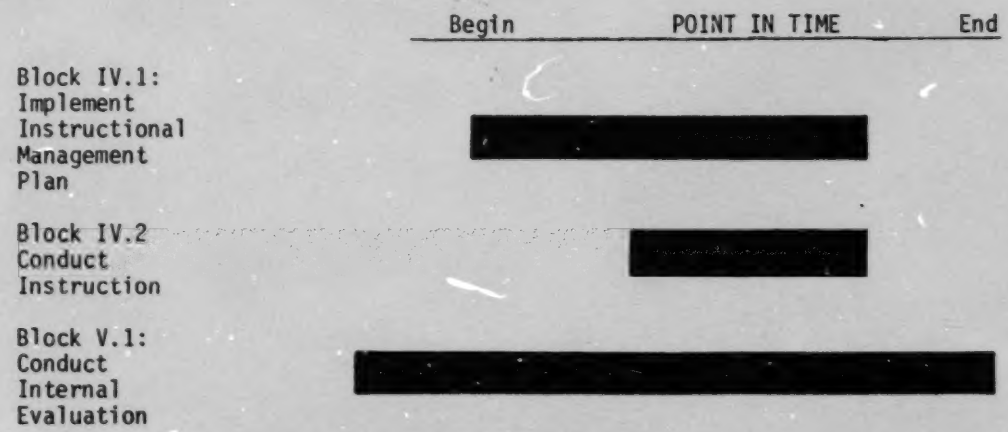


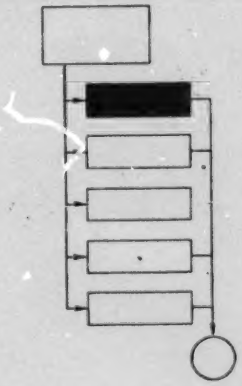
FIGURE IV.1: Approximate Points in Time When Several ISD Steps Take Place

While in most ways this implementation phase will be carried out as close as possible to the way it is intended to be carried out after the program is completely developed, there are some constraints. The necessary internal evaluation of the program will add some elements that will not be required later. Part of your responsibility here is to assure that these added factors modify the instructional event for the trainee to the least possible degree consistent with the requirements of the evaluation plan.

The steps in implementing the management plan are shown in the flow chart in Figure IV.2, the fold-out page at the end of this block.

2.0 PROCEDURES

2.1 Supplement Instructor's Manual



One of the critical items you should have received from the team that accomplished the development work in Phase III is an instructor's manual that describes the course and gives directions for administering the course. You should thoroughly review this document. As a minimum, it should contain the following:

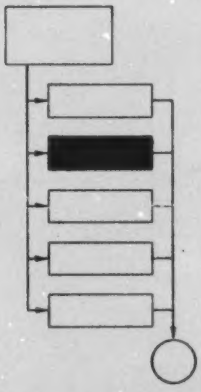
1. A clear, complete description of the course.
2. A description of the target population.
3. Directions for administering and scoring tests.
4. Directions for administering the course.

For more details of what should be included in the instructor's manual, refer to Block III.4, DEVELOP INSTRUCTION.

Be sure the information you need is included in the manual. If you are not satisfied with the manual, get back with those who developed it and attempt to resolve differences or obtain the missing information. If you still do not have adequate information to carry out your responsibilities, do what the manual says--even if you disagree. But document what you think should have been different; the ISD process is never complete, so there is still time for changes in any or all parts of the program.

In addition to a thorough review of the instructor's manual, you may need supplementary information. The reasons for this are:

1. Unless the instructor's manual was prepared with your particular training facility in mind, some necessary details may be missing. You may have to provide details of how the management plan will be integrated with the rules and regulations of your particular command, and with your facilities, equipment, personnel, etc. You will need to make sure of such essentials as scheduling, equipment locations, personnel assignments, contingency plans, and any other details peculiar to your particular situation.
2. The instructor's manual will not include the internal evaluation plan from Block V.1 since the information is not intended for later field use. The instructors may be required to complete forms or perform other activities not included in the manual. Observers and monitoring equipment may be present as a part of the evaluation plan. The instructors must be informed of all such factors that will have an impact on the manner in which they carry out the instructional function.

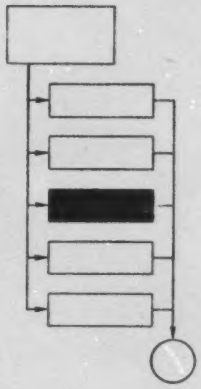


2.2 Supplement Student's Manuals

Most of what has been said about instructor's manuals is also true of student's manuals. The trainee must have a clear idea of what he is supposed to be doing if he is to make optimum use of the learning materials. Again, you will want to thoroughly review the student manual and go through the proper channels to clarify or modify any unacceptable areas. And again, as you did for the instructor's manual, you may need to provide supplementary materials describing unique characteristics of the particular instructional facility in which the trainee will participate.

It is particularly important to let the trainee know the role he is playing in this ISD effort. The particular course being conducted here is still in the development stage, and the trainee can help make it a better program. You need him and his cooperation. If you tell him this, he is likely to respond in a positive way. Most likely, the evaluation plan will require numerous inputs from the trainee that are not listed in the student's manual. You must supplement the manual by providing the trainee with clear instructions, not only as to what is expected of him, but also how the information will be used. This instruction may be developed for the trainees in any suitable manner including an oral presentation.

2.3 Train Staff



The instructor is a vital part of any instructional system, and the effort put into helping prepare him to undertake the functions expected of him will be effort well spent. Many instructors are not accustomed to instruction that emphasizes how the student performs rather than how the instructor performs. However, the instructor is just as critical to the ISD team as in a traditional setting. A clear understanding on his part of the critical functions that he must perform will help him fit into his role. Since the instructor will contribute heavily to the planning and carrying out of the implementation phase, he should be brought into the team as soon as practical.

The instructor often will be someone other than the designer, developer, or evaluator of instruction. He must be trained for his role as an instructor, and must be able to demonstrate his ability to work effectively in the particular training setting. An example of one instructor evaluation program follows:

EXAMPLE

Instructor Training Objectives

ACTION: Conduct training that causes learning.

CONDITIONS: The student will be given:

1. A Trainer Appraisal Kit (TAK)
2. A group of four to six students
3. A requirement to arrange for problem support and a problem site

4. Preparation time:
   a. 14 duty hours for a student's first presentation.
   b. 8 duty hours for subsequent presentations (except for failures)
   c. 4 duty hours on all repeats of failed TAK's.
5. Media Assistance Office resources

STANDARDS:

1. 80% of the students will meet the learning standard of the TAK.
2. Presentation time will not exceed the time limit specified in paragraph 4b of the TAK.

The instructor trainee delivers the instruction and pre- and post-tests to the students, and evaluates his own performance in terms of the amount the students learned.

He is also evaluated in terms of:

1. classroom management
2. instructor qualities
3. control of interest
4. lesson organization
5. establishing a good learning environment
6. improvising training aids

The itemized checklists and the scoring procedures and criteria are shown in Appendix A, page 19.

The instructors must become thoroughly familiar with the particular course. Make sure they have thoroughly reviewed the instructor's manual, student's manual, supplementary instructions, and all of the learning materials and equipment with which they will be involved. In some cases, specialized training will be required. For example, if they are to teach students to operate a certain piece of equipment, they may have to first learn to operate it themselves.

The instructors must be informed of the techniques and purposes of the internal evaluation plan that will be carried out during the course. Since they probably will be involved both as evaluators and as one of the variables being evaluated, they should have the opportunity to review what is being evaluated and why.

Most likely the instructors will be responsible for the testing of students; therefore, they must be thoroughly familiar with how the tests are supposed to be administered. When performance tests are to be used, special instructor training in test administration may be required.

A Trainer Appraisal Kit (TAK) as used in the Trainer Development Program (TRADEP) determines if the student can prepare and present instruction in such a manner as to cause learning. Each student, upon being assigned a TAK, receives a folder containing administrative instructions, a training objective, a sample test item, and background material on the subject to be presented. The TAK subject will be new to the majority of TRADEP students, yet will be one which can be effectively taught in 15-25 minutes (a specific time limit is designated in each TAK). After receiving the TAK, the student studies the training objective and background material, selects a method of instruction, designs and rehearses his class, then presents it to a group of 4-6 students. The preparation time allowed for each TAK varies according to the number of TAK's the student has already presented, but will always be specifically defined by the team monitor.

In TAK presentations, causing learning in students and instructor presentation skills, are emphasized co-equally. Other instructional modules, previously studied, are also tested during a TAK presentation. The tasks of the training objectives to be graded are: conduct training that causes

learning; demonstrate movement and gesturing techniques; prepare a 50, 100, and 200-man classroom for instruction; establish, maintain, and improve a good learning situation; improvise training aids; demonstrate the correct use of the pointer. See Appendix A for the instructor presentation techniques checklist.

Prior to the student's presentation of his TAK, the team monitor issues the students a pretest to screen out those individuals who can already perform the training objective to standard as well as identifies those students who do not meet the entry level requirements for the TAK.

The student then presents his lesson.

After the TAK presentation, the team monitor administers a posttest for the TAK training objective. The results of this posttest will be used by the student to deduce whether or not the minimum learning standard has been met, and as a basis for writing a list of recommended changes to alter the presentation of the TAK. Additionally, the team monitor critiques the student on his presentation techniques.

The TAK demonstrates a logical method of improving instruction using evidence rather than opinion, as justification for change. The practice the student receives in the preparation, presentation, and validation of instruction will make him a more effective instructor when he returns to his department.

EXAMPLE

Trainer Appraisal Kit (TAK)

1. TAK#: MAC 18 (B)
2. Characteristics of Typical Learners: See your team monitor

3. Title: Use of Military Explosives
4. Time Limits:
   a. Preparation time: See your team monitor.
   b. Presentation time: 15-20 minutes.
5. Necessary Equipment and Resources: None. Self-contained.
6. Training Objectives:
   TASK: Match each type of military explosive with its principal use.
   CONDITION: Given a list of 12 military explosives and a list of ten uses.
   TRAINING STANDARD: Ten of twelve answers must agree with Table 1 of the Background Information, para 8, below.
7. Typical Posttest Item(s) or Performance Test: Here is a list of common military armored vehicles and a list of the principal uses of common military armored vehicles. Write the letter corresponding to the name of each vehicle behind the number on the answer sheet which corresponds to its principal use.

Simple Item:	
A. M114	1. Troop Transport
B. M113	2. Tank Retrieving
C. M88	3. Reconnaissance
D. M578	

NOTE: Some principal uses may be matched with more than one vehicle.

8. Background Information:

   a. Military Demolitions. Military demolitions are the destruction by fire, water, explosive, mechanical, or other means, of areas, structures, facilities, or materials to accomplish the military objective. They have offensive uses, for example, the removal of enemy barriers to facilitate the advance and the construction of friendly barriers to delay or restrict enemy movement.
   b. Definitions.
      (1) Explosives. Explosives are substances that, through chemical reaction, violently change and release pressure and heat equally in all directions. Explosives are classified as low or high according to the detonating velocity or speed (feet per second) with which this change takes place.
      (2) Low Explosive. Low explosives deflagrate or change from a solid to a gaseous state relatively slowly over a sustained period. This quality makes the low explosive ideal for pushing or shoving a target. Examples are the smokeless and black powders.
      (3) High Explosives. The change in this type of explosive to a gaseous state--detonation--occurs almost instantaneously, producing a shattering effect upon the target. Detonation rates range from 1,000 meters per second (3,280 feet) to 8,500 meters per second (27,888 feet). High explosives are used where this shattering effect is requird--in certain demolition charges and in charges in mines, shells, and bombs.

Characteristics of Explosives

NAME	PRINCIPAL USE	APPROX. VELOCITY OF DETONATION (meter/sec) (feet/sec)	RELATIVE EFFECTIVE-NESS AS EXTERNAL CHARGE (TNT-1.00)	PACKAGING
TNT	Main charge, booster charge, cutting and breaching charge, general and military use in forward areas	6,900 mps 23,000 fps	1.00	Figure 1.
Tetrytol		7,000 mps 23,000 fps	1.20	Blocks similar to M5A1 charge
Composition C4 M5A1,M112		8,040 mps 26,379 fps	1.34	Figure 2.
Ammonium Nitrate Nitramon	Catering and ditching	3,400 mps 11,000 fps	0.42	Figure 3.
Black Powder	Time blasting fuze	400 mps 1,312 fps	0.55	Bulk

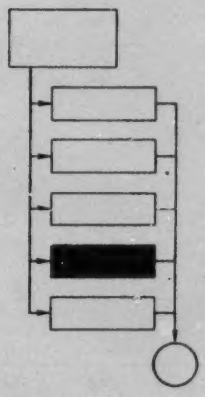
TAK MAC 18 (B)

Posttest: Write the letter(s) corresponding to the name of each type of military explosive following the number on the answer sheet which corresponds to its principal use.

A. Amatol 80/20
B. RDX
C. PETN
D. Straight Dynamite (Commercial)
E. Amonium Nitrate-Notramon
F. Tetrytol

1. Catering and Ditching
2. Shaped Charges
3. Detonating Cord, M118-Blasting Caps
4. Quarry and Rock Cuts

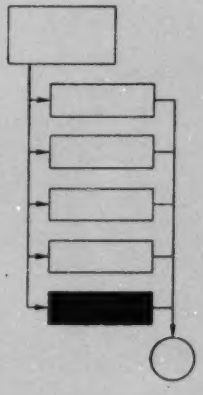
2.4 Monitor Student Selection



The instructor's manual will have defined the population for which the course was designed. That is, the required entry behaviors of students will have been outlined, and probably tests or other appraisal devices included to help determine if the prospective students are under-qualified or over-qualified to take the course. Remedial steps might be included as a part of the learning package to help under-qualified students learn the required skills and knowledge before beginning the major portion of the course. In any case, determine whether the students meet the target audience specifications. This information will be a useful input to the internal evaluation program to be discussed in Block V.1.

The number of students selected may be determined by agreement between those who developed the course and those who will evaluate the course, and the training facility, personnel, etc., constraints, or the number may be determined by normal course flow. In either case, find out how many students are to be involved.

2.5 Secure Time Allocation, Space, Materials, Equipment, Etc.



2.5.1 Secure Time Allocation

1. Determine when instruction will begin and end. The overall course time will be indicated in the instructor's manual. However, this often is just an estimate. Arrange for extra time if possible, even if it's after regular hours. Also, decide what to do with the students if they finish earlier than planned.
2. Time allocations per topic or block of instruction should be listed in the instructor's manual. These times may determine when and for how long certain equipment and facilities need to be reserved. However, again keep in mind that these times generally are estimates.
3. In self-paced programs, some individuals will finish before others. Self-pacing will, however, be meaningless if the faster learners have nothing to do after they finish their work. Sometimes, faster learners are permitted to leave and go to their next duty. Sometimes they can be utilized as peer tutors to help slower learners. Check the management plan and request modification of it within local constraints if necessary.

2.5.2 Secure Adequate Space

1. Make sure the allocated space is adequate for the number of students, instructors, and evaluation personnel, the kinds of instructional activities involved, and the number and kinds of instructional equipment.

2. Make sure the space is adequately heated, cooled, lighted, noise controlled, and has adequate safety precautions.

2.5.3 Secure Adequate Materials

1. Check the instructional materials to make certain the materials are what they are supposed to be and that you have sufficient copies for all the students.
2. Make sure all evaluation materials are available.
3. Check audio and video tapes. Make sure the correct items are in the correct quantities, and that items are clearly identified.

2.5.4 Secure Adequate Equipment

1. Make sure all equipment is available and operable.
2. Make sure operators will be available, and who to contact in case of equipment malfunction.

2.5.5 Miscellaneous

Even if you have done a perfect job of planning, you can depend on something going wrong. Do not set up a tight schedule for yourself for the periods of time when instruction is taking place. Probably you will be busy with contingency plans to work your way around the unexpected. Be sure you have access to your supervisor in case of insurmountable problems.

3.0 OUTPUTS

The outputs of this block should consist of:

3.1 Products

1. Supplementary instructions given to instructors (see Example page 17).
2. Supplementary instructions given to students (see Example page 17).

3.2 Other Documentation

1. Outline of special training given to instructors or other staff members.
2. Number of students included. Rationale for their selection. Any pertinent information about student qualifications and any required remedial work.
3. Outline of time allocation plan, facility, and equipment plan, and any additional student management plans not included above.

EXAMPLES

Sample supplement to instructors manual for course: OH-58 Helicopter Repair

A. Course Description

1. Installation facilities are adequate to train up to user support level maintenance.
2. Two decomissioned OH-58 Helicopters will be used in place of the main transmission trainer and transmission oil system trainer.
3. Unit clerical support maintains student files.
4. Mandatory briefings by the school commandant and base commanders' staff will require one half day during the first week of instruction.

Sample supplement to student's manual for course: OH-58 Helicopter Repair

1. A pretest will be administered before each block of instruction. Those who pass the pretest (achieve 90%) will be exempt from that block and will begin the next block of instruction.
2. Students who fail the posttest at the end of any block of instruction will receive remedial training. Those who fail a block after remedial training will be counseled by the instructor. The instructor will recommend either further remedial work or transfer from the training course.
3. A student-faculty review panel will consider all complaints between students and faculty.

APPENDIX A

INSTRUCTOR EVALUATION PROCEDURES

APPENDIX A

TEST STANDARD FOR CHECKLIST 5.81

DIRECTIONS: This critique sheet will be filled out in the following manner:

1. Mark all portions of each Item with a checkmark for pass; and an X for fail; or an O if not applicable.

2. After all portions of each Item have been judged, the rater will compile the results of each.

   a. If all portions of an Item are passed, it will be marked with a checkmark (pass).

   b. If one or more portions of the Item are failed, the Item will be marked with an X (fail).

   c. Non-applicable (O) portions of the Item will be counted neither as pass or fail. If all portions of the Item are marked O, the Item will be marked O (not applicable).

3. After all Items have been judged, the rater will compile the results of each Category.

   a. If 50% or more of the applicable Items in a Category are passed, the Category will receive a checkmark (pass).

   b. If less than 50% of the applicable Items in a Category are passed, the Category will receive an X (fail).

   c. If all Items in a Category are not applicable, the Category will be marked O (not applicable).

4. Training Objective 5.81 (for TAK-s) or 5.82 (for 50-minute Final) is passed if all applicable Categories and 80% or more of all applicable Items are passed.

THE INSTRUCTOR PRESENTATION TECHNIQUES CHECKLIST (5.81)

Problem Number & Title _____

Date_____

Nominee _____

___ Category 1: Classroom Management

___ Item A: Room Appearance (USAIS Staff & Faculty SOP, para 1.13 & para 9.19).

___ The classroom is clean.

___ Desks are arranged neatly.

___ Item B: Class-in-Session lights are turned on. (Classroom management Handbook, p. 6).

___ Item C: Podium Cards (USAIS Staff & Faculty SOP, para 2.12).

___ All sets of podium cards are arranged with lesson title on top, student class in the middle, and instructor's name on the bottom.

___ The correct number of sets of podium cards (two sets for 50-man classroom, three sets for 80-series classroom, and three sets for a 200-man classroom) is displayed.

___ Item D: Visitor's Folders. (USAIS Staff & Faculty SOP, para 2.18).

___ The proper number is used (two in a 200-man classroom, one in all others). (USAIS Staff & Faculty SOP, para 2.18a).

___ Folder(s) is (are) in the correct location (one at the table in the rear of the classroom and for 200-man classrooms, one in the visitor's booth). (USAIS Staff & Faculty SOP, para 2.18a).

___ A pad of paper and pencil are provided with each folder.

___ Item E: Lighting. (TRADEP Handbook, para 6-7).

___ Lights are turned up when the instructor is the focus of attention or the students are working on a practical exercise.

___ Lights are turned down when modified lighting is necessary to highlight a film, slide, or some other training aid.

___ Item F: Spotlights. (TRADEP Handbook, para 6-7).

___ Spotlights are used to highlight the instructor or a training aid.

___ Are they used so as to not "wash out" any visuals?

___ Item G: Curtains. (FM 2-16, Test Edition, p. 86).

___ They are kept closed except when opened for a video presentation or to expose a training aid.

___ When opened, only the area necessary is exposed i.e., only the blackboard or screen in use.

___ Item H: Sound. (Classroom Management Handbook, p. 12).

___ The sound is adjusted so that all personnel in the classroom can hear the presentation clearly.

___ The sound level is adjusted so that there is no "feedback" (high pitched squeak) in the system.

___ Item I: Special effects. Special effects are used to add emphasis to a key point or retain attention without creating a "dog and pony show" atmosphere. (TRADEP Handbook, para 6-4).

Remarks:

Total applicable Items: _____

Items passed: _____

$$\frac{\text{Items passed}}{\text{Total applicable Items}} = \_\_\_\_\_\%$$

___ Category II. Instructor Qualities

___ Item A: Appearance.

___ The instructor's appearance is in compliance with AR 670-5 and AR 672-4-1.

___ His appearance is neat (shoes and brass shined, clean uniform, etc.).

___ His posture is good. (TRADEP Handbook, para 7-18).

___ The uniform fits properly.

___ Item B: Voice.

___ He can be heard throughout the classroom without shouting. (FM 21-6, Test Edition, p. 85).

___ He varies the volume of his voice. (TRADEP Handbook, para 7-14).

___ He clearly enunciates (speaks clearly). (TRADEP Handbook, para 7-6; FM 2-16, Test Edition, p. 85).

___ He correctly pronounces his words. (TRADEP Handbook, para 7-6).

___ He uses correct grammar. (TRADEP Handbook, para 7-7).

___ His rate of speech is varied. (TRADEP Handbook, para 7-8).

___ The narrative is interspersed with pauses that highlight key points. (TRADEP Handbook, para 7-10).

___ His voice projects sincerity and a feeling of interest in each student. (TRADEP Handbook, para 7-14; FM 21-6, Test Edition, p. 84).

___ Item C: Movement. (TRADEP Handbook, para 7-19).

___ His movement covers the entire stage.

___ He uses "V's" and "W's" to keep the microphone cord out of his way and maintain contact with the entire class.

___ He moves naturally and with a purpose.

___ He avoids blocking the view of his training aid.

___ Item D: Gestures. (TRADEP Handbook, para 7-20).

___ His gestures emphasize the spoken word.

___ The gestures are visible to the entire student body.

___ Gestures are made in a natural manner.

___ Distracting or antagonistic gestures and mannerisms are eliminated. (FM 21-6, Test Edition, p. 84).

___ Item E: Directness. (FM 21-6, Test Edition, p. 87).

___ He maintains eye contact with the student body.

___ He remains facing the student body, even when moving.

___ Item F: Questioning Techniques.

___ All questions asked emphasize a point, keep students alert, check understanding of a key point, review material, or stimulate thought. (FM 21-6, Test Edition, p. 85).

___ All questions require a response other than "Yes" or "No." (FM 21-6, Test Edition, p. 85).

___ The "ask - pause - call" technique is used in all questions. (FM 21-6, Test Edition, p. 85-86).

___ All questions are properly phrased? (FM 21-6, Test Edition, p. 85-86).

___ Are all student answers evaluated as right or wrong? (FM 21-6, Test Edition, p. 86).

___ The question answering technique encourages further student response. (FM 21-6, Test Edition, p. 86).

___ Item F: Subject Preparation.

___ He teaches without fumbling for words and showing uncertainty before proceeding. (FM 21-6, Test Edition, p. 84).

___ The lesson is presented without frequent referral to notes or slides. (TRADEP Handbook, para 6-7c).

Remarks:

Total applicable Items: _____

Items passed: _____

$$\frac{\text{Items passed}}{\text{Total applicable Items}} = \_\_\_\_\_\%$$

___ Category III. Control of Interest.

___ Item A: Student Involvement. The students are involved in the teaching process through maximum use of questions and practical exercises. (FM 21-6, Test Edition, pp. 6-7 & p. 83). (TRADEP Handbook, pp. 1-8 to 1-9).

___ Item B: Humor. Humor used in the presentation is appropriate (no religious, racial, or sexual overtones). (FM 21-6, Test Edition, p. 85).

___ Item C: Training Aids. Training aids are used where the subject requires visual or audio support. (FM 21-6, Test Edition, p. 87-88).

___ Item D: Interest Factors. Interest factors are used to contribute to the class. (TRADEP Handbook, para 8-3).

___ Category IV: Lesson Organization.

___ Item A: Introduction. (TRADEP Handbook, para 4-4).

___ A Gain Attention step is used.

___ The subject is tied in to previous and subsequent instruction.

___ The training objective is fully explained. (FM 21-6, Test Edition, p. 40-42).

___ Item B: Body.

___ The class is broken into meaningful segments. (FM 21-6, Test Edition, pp. 11-18).

___ The segments of the class are presented in a logical sequence. (FM 21-6, Test Edition, pp. 18-19).

___ Transitions are used to move from one segment to another. (TRADEP Handbook, para 4-9).

___ Item C: Conclusion. (TRADEP Handbook, para 4-5).

___ The students are alerted for the review.

___ All main points are reviewed in a logical sequence.

___ There is a strong concluding statement.

Remarks:

Total applicable Items: _____

Items passed: _____

$$\frac{\text{Items passed}}{\text{Total applicable Items}} = \_\_\_\_\_\%$$

___ Category V. Establishes a Good Learning Environment.

___ Item A: The nominee communicated an OPTIMISTIC, HIGH STANDARD OF EXPECTATION to the group.

___ Item B: The objective was NEGOTIATED (EXPLAINED) until all the group came to see it as valid, important, attainable, and personally valuable.

___ Item C: The nominee provided at least one INCENTIVE (tangible or intangible) for good performance.

___ Item D: The nominee "REINFORCED" any (and all) approximations of behavior(s) in the objective(s) occurring during the practice portion of the lesson accomplished.

___ Item E: The nominee "EXTINGUISHED" any (and all) inappropriate actions of the group.

Remarks:

Total applicable Items: _____

Items passed: _____

$$\frac{\text{Items passed}}{\text{Total applicable Items}} = \_\_\_\_\_\%$$

___ Category VI: Improvises Training Aids.

___ Item A: The training aid(s) used:

___ Reinforced the spoken word.

___ Directed learner thinking to specific item(s).

___ Aided the learner to perform the objectives.

___ Made things clearer.

___ Aided in retention.

___ Item B: The training aids were:

___ Appropriate, Simple, Accurate, Necessary, Attractive.

___ Not a distraction.

___ Large enough to be seen by everyone in the classroom.

___ Not used as a crutch by the instructor.

___ In the proper position on the platform.

___ Removed or covered when no longer required.

___ Item C: If an Overhead Projector (Vu-graph) was used:

___ The slides used were neat and attractive.

___ Slides did not contain too much material.

___ The lettering was large enough to be seen by all learners.

___ The projector was turned off when no longer required.

___ Item D: If the chalkboard was used:

___ The lettering was of proper size to be seen by all learners.

___ The lettering was neat.

___ Learners were asked to assist in developing material.

___ Too many abbreviations were used.

Remarks:

Total applicable Items: _____

Items passed: _____

$$\frac{\text{Items passed}}{\text{Total applicable Items}} = \_\_\_\_\_\%$$

SUMMATION

Applicable Categories passed _____ Applicable Categories failed _____

Applicable Items passed _____ Applicable Items failed _____

% Applicable Categories passed _____

% Applicable Items passed _____

Go/No-Go

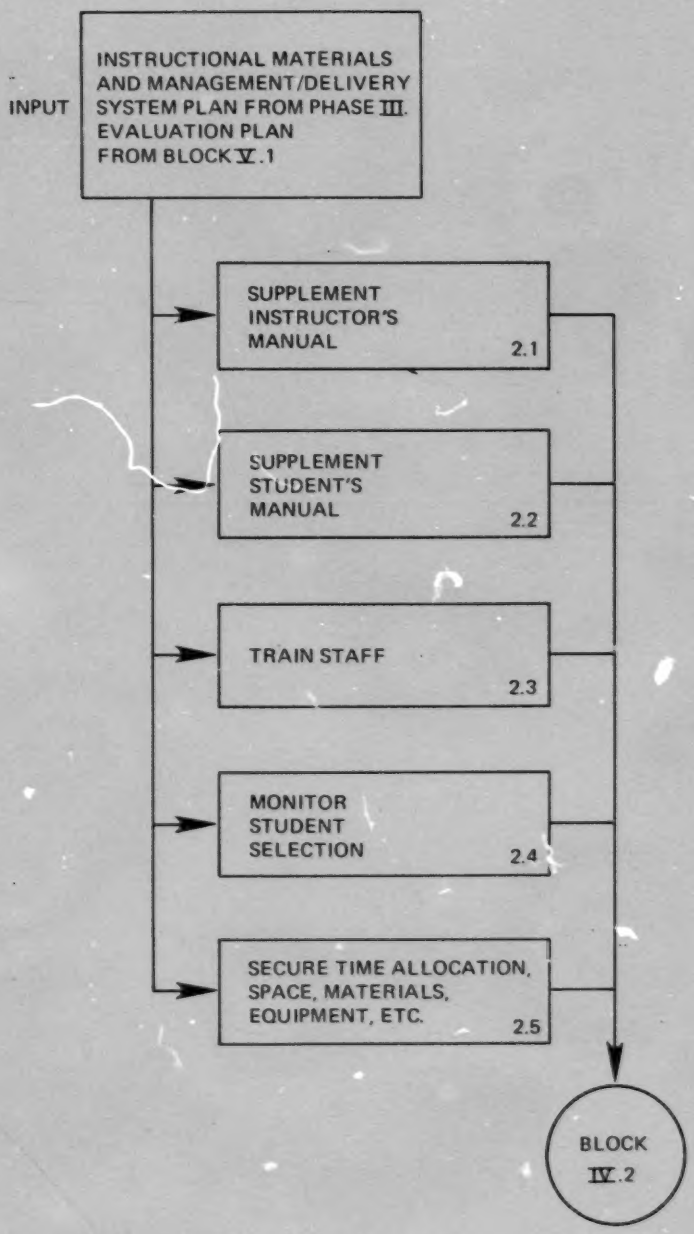
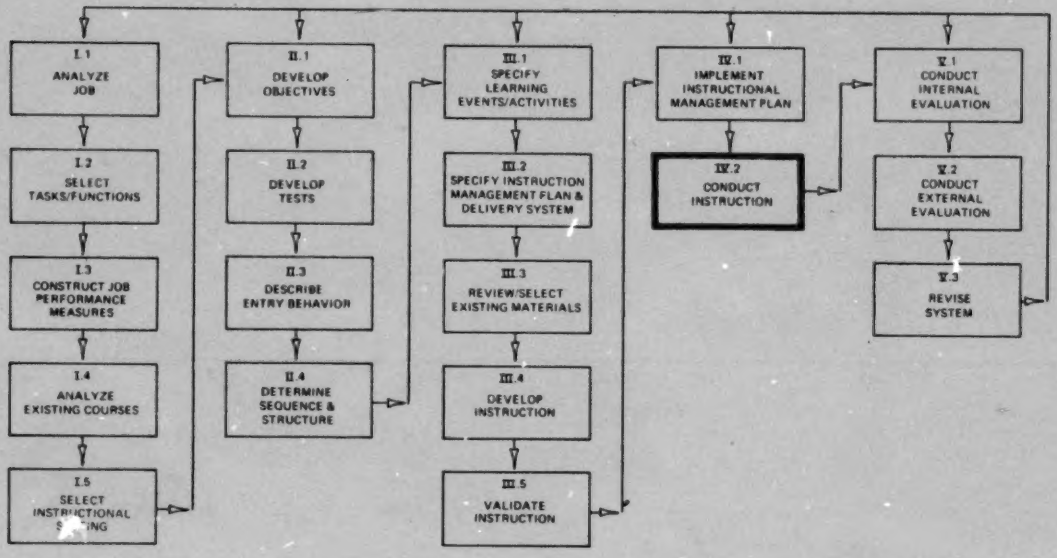

INPUT
INSTRUCTIONAL MATERIALS AND MANAGEMENT/DELIVERY SYSTEM PLAN FROM PHASE III. EVALUATION PLAN FROM BLOCK V.1
SUPPLEMENT INSTRUCTOR'S MANUAL 2.1
SUPPLEMENT STUDENT'S MANUAL 2.2
TRAIN STAFF 2.3
MONITOR STUDENT SELECTION 2.4
SECURE TIME ALLOCATION, SPACE, MATERIALS, EQUIPMENT, ETC. 2.5
BLOCK IV.2

FIGURE IV.2: Flowchart of Block IV.1: IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN

BLOCK IV.2: CONDUCT INSTRUCTION



OVERVIEW

After tne instructor has been oriented to the instructional materials, and has mastered the necessary skills, he conducts instruction in accordance with the instructor's manual. As a part of the instructional activity, he documents any required changes and other observations, and participates in follow-up activities.

CONDUCT INSTRUCTION

1.0 INTRODUCTION

From a practical point of view, it is almost impossible to design instruction that will provide solutions to all possible problems. Some students will always have trouble mastering certain objectives, and performing certain tasks. The trouble spots will be different for different people. One of the major duties of the instructor is to identify such problems and to provide assistance where needed. There will be students who are unusually fast or slow. The more capable students must be kept from becoming disinterested and bored, and the problems of the less capable students must be diagnosed and appropriate action taken. While the ISD approach can make certain provisions for training individuals of varying capabilities and degrees of motivation, it continues to depend on classroom managers or instructors to meet unexpected requirements.

In self-paced instruction, lectures are minimized and the instructor relies on prepared materials and other delivery systems to present much of the instruction. This frees the instructor from many of the routine tasks of teaching so that he can provide both academic and personal attention to individual students. He must diagnose student problems and plan actions to remediate those problems. The process of providing guidance or of counseling individual students may be a new role for some instructors, yet, it is a most important function.

As developments in the concepts of self-paced instruction grow, the instructor will become increasingly more professional as a manager of instruction. He will be able to devote more of his attention to the problems and needs of the individual student. As such, he assumes different roles: that of an FOJT supervisor, the manager for a correspondence course, a classroom manager, or an individual tutor and counselor.

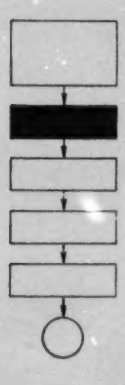
It is probably fair to say that at this particular point in the ISD process, the emphasis is primarily on the instructor as a manager of instruction. This is true because one of the primary purposes of conducting instruction is to insure that the instructional program will accomplish what it is intended to accomplish. If the program succeeds, it should do so on its own merits and not because of a unique performance on the part of the instructor. For this reason, the primary responsibility of the instructor in this block is to conduct instruction as close as possible to the method outlined in the instructor's manual.

The instructor is a crucial member of the ISD team, and as such he must be involved in certain preparatory steps prior to conducting instruction, and must participate in certain critical post-instruction activities.

The steps in the conduct instruction function are shown in the flowchart in Figure IV.3, thy fold-out page at the end of this block. These steps will now be discussed in some detail.

2.0 PROCEDURE

2.1 Review all Course Documentation



The instructor should thoroughly review all the course documentation including the instructional materials, tests, instructor's manual, student's manual, and evaluation plan. Some of these items may still be in a formative stage of development. In this case, the instructor's ideas can become an important input to completion of the items.

Be thoroughly familiar with the instructional materials. If special training is required to provide the necessary expertise in some areas, be sure you have it. If you do not fully understand all parts of the instructor's manual, and the additional instructions added in Block IV.1, you should make the problems known, and suggest improvements.

Since instruction produced according to ISD principles will have tests associated with units or modules of instruction, one of the instructional duties is to administer these tests. It is essential that the test administrator be totally familiar with the tests and that he understands the agreed upon standards for satisfactory student performance. Many of the tests will be performance tests and he will need to be particularly attentive to the procedures for administering them.

In some situations, your only function may be to administer tests. This approach has the advantage of consistency--a limited number of specialists administer the tests to all students. In other situations, you may provide the instruction and administer the tests to the trainees.

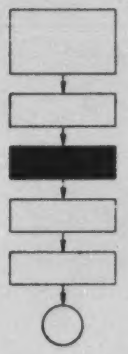
This situation is less desirable because it tends to cause a false sense of competition among instructors. Also, it is not uncommon for instructors to hint or advertise the points on which there will be test questions, or, in response to student questions, present unusually detailed answers only on those points known to be on the test. The unfortunate outcome from such practices is to make students appear to know more than they really do, potentially penalizing them when they get to the job. If you must give instruction and also administer tests, make sure to follow the testing rules as precisely as possible in order to avoid halo effects and errors of standards.

Since most of the tests will be scored on absolute standards, and since one purpose of ISD is to get the maximum possible percentage of students to meet the criterion, many students will have to be "recycled" to those parts of the course, module, or unit that they did not pass. You must make decisions in such matters on the basis of the testing rules agreed upon by the whole ISD team and on the student's performance. You will be in the position of deciding when the student has met all expectations of the course and is ready to move on to the next assignment.

Remember that when the trainee reports to his base, ship, or unit, he is the product of your course. If he was not properly instructed, he is not likely to perform well. If he was passed on the test when he should not have been, he is likely not to be able to perform on the job. On the other hand, if he is required to meet unreal or unreasonable standards, he may never get out of the course. For these reasons you should follow the testing instructions as closely and fairly as possible.

In some self-paced courses, students will be in a hurry to finish, either because they work faster than other people, or because they are in a hurry to get where they are going next. Other students may enjoy the benefits of the location of the school and attempt to make a career of the course. The instructor is in the best position to work with and counsel students on their course progress. Increasing the speed with which each student completes the course, even by a modest amount, can have an important impact on the cost of the course and the number of trained people available to the battalion, squadron, or fleet.

2.2 Obtain Required Training



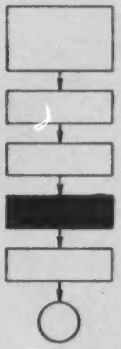
You as the instructor need to be thoroughly familiar with the subject you will be teaching. This may require taking special training in the subject-matter area. Particularly when teaching the use or maintenance of a new weapon or piece of equipment, you will first need to become somewhat of an expert in handling the equipment. Even if you are an expert in the subject-matter area, you still may need training in the use of the particular delivery system to be used in the course.

You may need special preparation in administering performance tests. Following are steps you should take when performance testing is required.

1. Read the test several times, so that you understand what is required by it.
2. Assemble the necessary equipment for giving the test and lay it out as stated in the test conditions.

3. Go through each performance measure yourself, doing it as required in the test. Go through the measures several times until you can perform them with ease.
4. Have another, qualified person give the test to you, so that you can observe, as you are being tested, test administration by someone who is skilled in giving the test.
5. Give the test on a try-out basis. This allows you to practice giving the test; that is, in reading the instructions so they can be understood, rating performance, and briefing participants in what they did correctly and incorrectly.

2.3 Conduct Instruction and Document Observation



As a member of the instructional staff of a course produced by ISD, you have been oriented to the course, have mastered skills necessary to conduct the course, and are ready to start the first group of students. The adequacy of space, facilities, and materials has been checked out to make sure you have enough instructional materials and resources for the staff and the students. Your job is to follow the instructor's manual to provide the ISD instruction for the students, and collect data that will help in evaluating and improving the course.

Your major responsibilities are:

1. To carry out instructional activities exactly as the instructor's manual specifies unless it is impossible to do so,
2. To keep records, either in your course guide or in a log book kept for that purpose (or in both), of all changes from the original course, whether these changes are small or large, temporary or lasting, and
3. To make specific notes on problems students have with the learning materials.

The reason for the above is that the evaluation of the course is supposed to be on the course as it is delivered to you from Block IV.1. Any changes must be considered in the evaluation so that the instructional staff and management personnel can make recommendations based on what actually happened. For example, if an audio-visual lesson is so consistently a problem to students that the instructor has to replace that particular lesson with tutoring or a talk and demonstration, the change from media to instructor must be documented. If it is not documented, any test results the instructor gets from his demonstration could be interpreted as the results from the audio-visual materials. Then any necessary improvement in the lesson could be overlooked for future conduct of the course.

There are three kinds of changes the instructor might have to make during course implementation. They are editorial, procedural, and content.

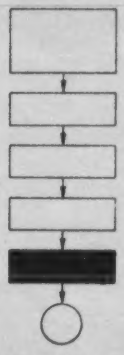
Editorial changes generally do not require approval. Many different kinds of routine, mechanical problems such as misspellings, typographical errors, grammatical errors, poor reproduction quality in printing, missing

pages, and misnumbered pages can be changed quickly on a master copy and on the instructor/student copies during the course. These do not change the content or procedures of the course, and aside from needing to be recorded for future materials production, generally require no additional action.

Any change in directions to students is a procedural change, and should be recorded along with the reason for the change. In addition, if it is intended to be a permanent change in course procedures, a written request for the change should be filed in compliance with local regulations. If, for example, extra instruction sessions are found necessary at certain points in the course to reorient students, this procedure, along with the reasons why it was needed, should be thoroughly documented. This is the type of input that facilitates accurate evaluation and requires revision of the course.

The instructional materials may require changes, additions, or deletions. If such a need arises, approval should be secured prior to making the change. At the very least, the extent of and reasons for the change should be thoroughly documented.

Document all important observations relative to the instruction. For example, revised time estimated for different blocks of instruction, equipment problems, and inadequacies of space and other facilities should be documented.



2.4 Participate in Follow-Up Activities

As the ISD team expert on conducting instruction, you will need to participate in the follow-up activities in which decisions must be made to improve the

effectiveness of the instructional program. While the extent of your participation will partially depend on the procedures of your particular command, your statements of what happened during the course and your recommendations for changes will be an important input to Phase V of the ISD model.

3.0 OUTPUTS

The outputs of this block should consist of the following documentation:

1. A record of actual times required for different parts of the course,
2. Any deviations from the instructional plan and reasons for the deviations,
3. Specific notes on any problem areas in the course,
4. Any suggested changes in the course and rationale for the changes.

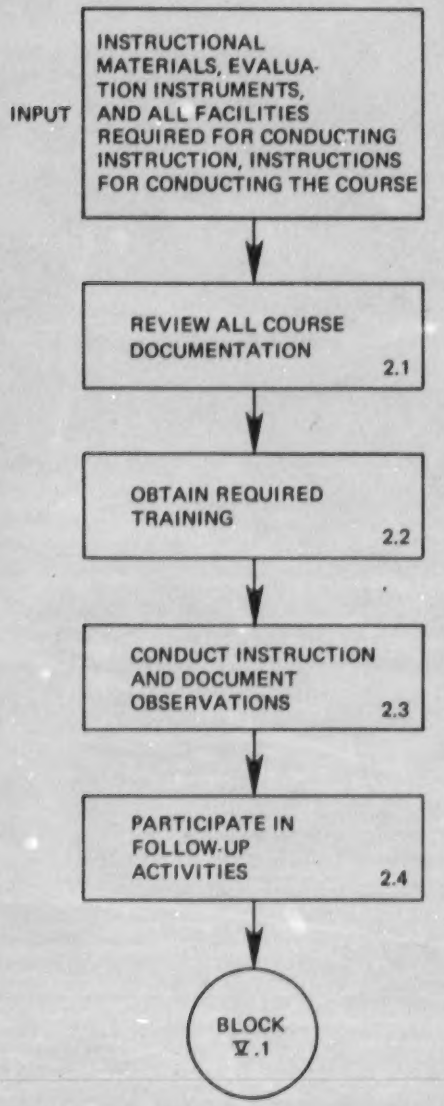

INPUT
INSTRUCTIONAL MATERIALS, EVALUATION INSTRUMENTS, AND ALL FACILITIES REQUIRED FOR CONDUCTING INSTRUCTION, INSTRUCTIONS FOR CONDUCTING THE COURSE
REVIEW ALL COURSE DOCUMENTATION 2.1
OBTAIN REQUIRED TRAINING 2.2
CONDUCT INSTRUCTION AND DOCUMENT OBSERVATIONS 2.3
PARTICIPATE IN FOLLOW-UP ACTIVITIES 2.4
BLOCK V.1

FIGURE IV.3: Flowchart of Block IV.2: CONDUCT INSTRUCTION

REFERENCES

REFERENCES

PHASE IV

Block IV.1

Department of the Air Force. Instructional system development (AFM 50-2). Washington, D.C.: Headquarters, United States Air Force, Air Training Command, December 1970.

The planning and management functions essential to successful implementation of a course is discussed in this document. Chapter 16, "Operation and Evaluation of the Instructional System," presents helpful information dealing with the changing roles of instructors and students and the functions of management in an instructional system.

Department of the Army. Trainer development program (TRADEP) progress report. Ft. Benning, Ga.: United States Army Infantry School, January 1975.

A Trainer Appraisal Kit as used in the Trainer Development Program determines if the student can prepare and present instruction in such a manner as to cause learning. This report contains the training objectives that the TRADEP student uses, including the TAK objectives.

REFERENCES

PHASE IV

Block IV.2

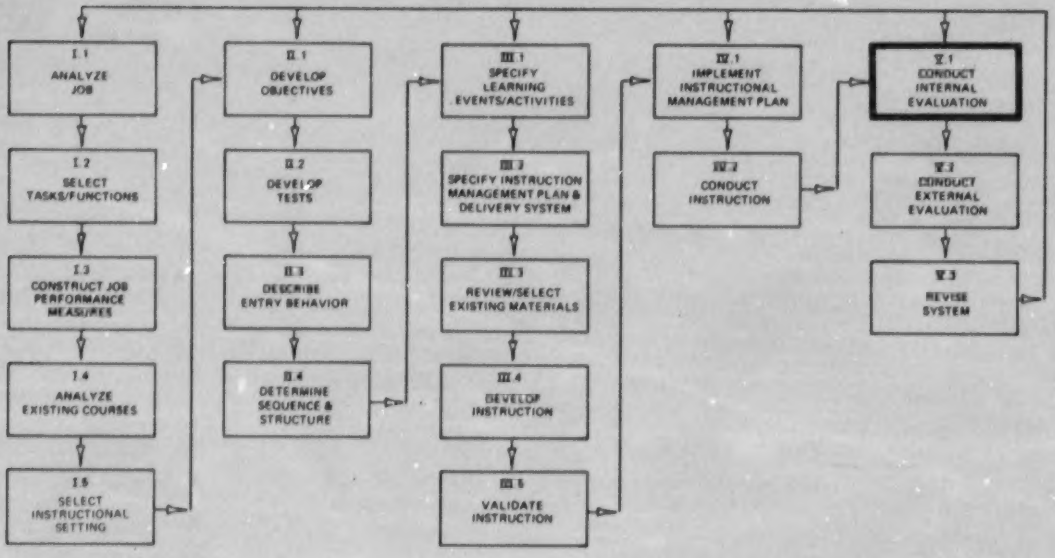
Department of the Air Force. Instructional systems development (AFM 50-2). Washington, D.C.: Headquarters, United States Air Force, Air Training Command, December 1970.

The trends toward implementing the concept of individualized instruction present several problems for management. One of the more immediate problems is to teach the instructor the functions expected of him in the system so that he can be ready to assume his instructional duties and assist with validation. This and other management problems are discussed in the context of conducting instruction.

Department of the Army. Trainer development program (TRADEP) progress report. Ft. Benning, Ga.: United States Army Infantry School, January 1975.

This report presents the latest information on the development of the Trainer Development Program (TRADEP). Composed of lists of training objectives of the TRADEP, the training objectives are designed to provide the TRADEP student with an accurate description of the performance expected of him upon completion of training, which is aimed at determining whether or not he can be an effective in-instructor.

BLOCK V.1: CONDUCT INTERNAL EVALUATION



OVERVIEW

Internal evaluation is planned and conducted primarily to determine whether the instructional development goal has been reached. Data are collected not only to assess student progress, but more importantly, to improve the quality of instruction. The process consists of collecting pertinent progress and process data, performance data, and information from students, instructors, and other informed personnel; evaluating this data; and making recommendations.

CONDUCT INTERNAL EVALUATION

1.0 INTRODUCTION

The primary purpose of internal evaluation is to determine whether the instructional development effort has accomplished what was intended. While this is the global aim, the procedures are specific and are concerned with the aspects of the course that are subject to measurement and informed judgment. One principal function, if not the most important function, of the internal evaluation process is to provide sufficient good data upon which to base decisions about the instruction.

The quality of the evaluation is totally dependent upon the ability to measure specific variables with accuracy and precision. One of the guiding principles of ISD is that wherever possible, decisions about instruction are made on the basis of specific data collected according to established standards. The intention is to move from vague and qualitative statements about effectiveness to specific quantitative statements wherever possible. Effective measurement can make this intention a reality.

Perhaps a general example of the same concern from another field would be helpful. In the early days of flying, it was most helpful to pilots to know the direction of the surface wind prior to landing. The simple device of the windsock provided a visual indicator of the wind direction and a crude measure of the velocity. While it was relatively easy to design an instrument which would show the direction of the wind, informing the pilot of the true velocity was a completely different

matter. As time passed, this information eventually could be transmitted by radio to the aircraft, and the pilot could make better decisions. Today's avionics represent the results of a long and directed effort to improve the information provided to the decision maker, with the longer term purpose of improving system performance and safety through careful research, measurement, and evaluation.

The last fifty years have seen improvements in the measurement and evaluation of human behavior and instruction almost as dramatic as in the avionics example mentioned above. First, it was important to find features or variables which could be measured reliably; that is, where repeated measures by the same or different people would arrive at highly similar results. Once the measures are made reliable, it is only necessary to accumulate sufficient data to find out what the measures mean.

In the ISD process enough data on students must be collected so that, through time, instruction can be improved based on students' performance. Generations of teachers have collected data on students. That is, they have recorded scores on tests given in class and have used the scores as the basis for assigning grades at the end of a period. But what makes the ISD process new and unique is that the collected data are examined not only to assess student progress, but also to judge and improve the quality of the instruction. So, in addition to the grades assigned to students, scores now are recorded for each segment of instruction to see how well it performs. If, through time, a large proportion of people have trouble with the same segment, it is reasonable to believe there might be something wrong with the instruction. Thus, data collected

on students is a necessary input to the ISD process, not just a means of deciding which student gets which grade.

Evaluators are continuously looking for sources of better data. It might be useful to distinguish between two kinds of data: hard and soft. Hard data are more direct measures of the variable of interest. In order to test whether someone knows how to measure and record a patient's blood pressure, the alternative choices are ranked as follows:

1. The best (hard) data would be found in the results of a JPM.
2. A pencil and paper test for the task would be less direct, and would not be hard data.
3. The persons supervisor could be asked about the invididual's performance.
4. Asking the person directly if he could perform the task may be even less useful than asking a supervisor.

In this list of alternative choices, the data get softer in moving from direct observation of the performance to the recording of student's opinions.

Data obtained from attitude or opinion surveys or other rating forms may be the only collectable data. It is soft, but if it is all that is available, it must be used. However, the confidence in the conclusions drawn will be much lower. A more complete discussion of the problems encountered in the use of rating data was given in Block I.3. Ideally, direct measurement should always be used.

Since internal evaluation is concerned with the evaluation of the ISD process in any selected instructional setting, the measures used will be the best possible trade between the real world conditions and

the measures available in the instructional setting. Can antiaircraft gunners make an acceptable number of hits under battle conditions in rough seas? Since testing under these conditions is rarely possible, a measure must be used that will give the best approximation of the real world performance. In many Defense Occupational Specialities (DOSs), the measures of student performance can be performance of the actual task.

In other DOSs some measures may only be simulations of the task. In the case of the Gunner's Mate, the task most likely will be simulated, but in the case of the legal clerk or yeoman, the actual task may be used.

In addition to the performance data collected on students through the administration of tests, descriptive data such as student ratings, opinions, and reports of critical incidents are collected on the instructional materials and processes. Instructors are a valuable source of data. They can report problems with any part of the instruction, such as difficulties students have had with certain objectives, time spent in presenting the instruction, and opinions about instructional materials and procedures. As these data accumulate, it is possible to make better decisions. For example, if a number of people had difficulty with a certain unit objective and if the instructors consistently reported that the materials were incorrect or confusing, the evidence is mounting that something is wrong.

But, notice that if the instructors had judged the materials to be confusing and the students regularly passed the tests, then the problem may be with the instructors, not with the materials. This is an example of the value of hard data (student performance) over soft data (opinions of instructors) in making the entire ISD process work. It is an example of replacing collective opinion with hard facts. Sources and uses of several kinds of data are presented in Table V.1.

TABLE V.1

SOURCES AND USES OF DATA COLLECTED FOR EVALUATION

SOURCE	HOW COLLECTED	TYPE OF DATA	USES
Students	A. Questionnaire; blank form	A. Historical Personal characteristics; prior experience; prior training	A. 1. Build data base for future predictions 2. Identify potentially unqualified trainees 3. Identify trainees for possible advanced placement
	B. Pencil and paper; performance test	B. Performance 1. Entry skills 2. Pretest scores 3. Unit posttests 4. Final tests	B. 1.a. Identify trainees needing preparatory training b. Determine beginning point for instruction 2.a. Exempt trainees from units of instruction b. Determine baseline knowledge c. Measure gains 3.a. Score students as go/no-go on unit b. Measure gains c. Analyze effectiveness of unit of instruction d. Predict future performance e. Revise posttests f. Revise unit 4.a. Score student as go/no-go on total b. Measure gains c. Analyze effectiveness of total instruction d. Revise final test e. Revise total instruction

TABLE V.1 - Continued

SOURCES AND USES OF DATA COLLECTED FOR EVALUATION

SOURCE	HOW COLLECTED	TYPE OF DATA	USES
	C. Interview, questionnaire	C. Opinion or Preference 1. Ratings of instruction 2. Ratings of instructors 3. Critical incident reports	C. 1.a. Build data base for comparison with ratings on other instruction b. Isolate problem areas with the instruction, particularly where these data agree with test data 2. Isolate problem areas with instructors, particularly where these data agree with test data 3. Identify problems in management system and instruction
	D. Unobtrusive observation	D. Attitudinal 1. Demerits, disciplinary action 2. Breakage or loss 3. Complaints to supervisors	D. Compare with data from other similar programs to determine if instruction includes especially motivating or demotivating materials or procedures
	E. Time sheets observation	E. Time 1. Time to complete units 2. Time to use materials 3. Time required for exercises 4. Total time to complete	E.a. Build data base for comparing delivery and management system with other alternatives b. Build data base for cost comparisons c. Make decisions on student flow

TABLE V.1 - Continued

SOURCES AND USES OF DATA COLLECTED FOR EVALUATION

SOURCE	HOW COLLECTED	TYPE OF DATA	USES
Supervisors/ Managers	A. Past schedules projected schedules actual schedules	A. Management requirements student queuing data equipment requirements space requirements courseware requirements instructor requirements	A.1. Build baseline 2. Prepare projected schedules, assign personnel, space, and equipment 3. Evaluate resource use and compare with baseline. Revise time and requirements schedules
	B. Interview, questionnaire	B. Opinion or preference of 1. ratings of students 2. critical incident reports 3. reports of student problems	B.a. Identify rating errors b. Revise instruction, management system, and instructor training
	C. Time sheets observation	C. Total work time amount of time spent interacting with students	C. Revise management plan and build data base for instructor requirements

Each block in the model has outputs in the form of products and other documentation. These outputs can be evaluated if they are judged or rated in a systematic way. First, the evaluator will want to know if the outputs are consistent with the instructions and the requirements of the local command. If there are elements missing, or if it appears that the outputs were documented as a part of a "paper exercise," these facts need to be recorded.

For example, a number of years ago, a military command issued a regulation requiring the systematic design of all courses. When the regulation was put into operation, two important problems existed:

1. Only a few of the people who received the regulation knew how to do what was required, and
2. Schools were asked to report within three months, on the number of courses which were in compliance with the regulation.

The results were predictable and bad. Subsequent audit of a number of courses that had been reported to be in compliance with the regulation revealed that the required process of recording information on a particular form had been accomplished. But, instead of getting the data from the field as the regulation required, the data had been gathered from class notes on instructors. Resources had been used in an unproductive way and the desired results from the regulation never materialized. The conclusion reached by many: The whole regulation is bad--do away with it!

This problem could have been avoided if the products and other documentation had been evaluated by an internal evaluation team and properly

inspected by higher headquarters. The first finding would have been that the reporting requirements were unrealistic in terms of time. It is highly unlikely that the ISD procedures for a course could be completed in three months. The second findings probably would have been that there were insufficient trained personnel to execute the requirements, even with adequate time. These two findings could have allowed management to take corrective action.

A final form of internal evaluation deals with the progress and schedule of the ISD effort. When it is decided to start new instructional programs or revise old ones using ISD procedures, a project schedule should be developed using Program Evaluation Review Technique (PERT) or other suitable methods. The manager of the ISD program should keep records of progress and problems so that those affected can make logical management decisions. For example, if the personnel system is to assign students, a reasonable estimate of the development and start-up time must be known.

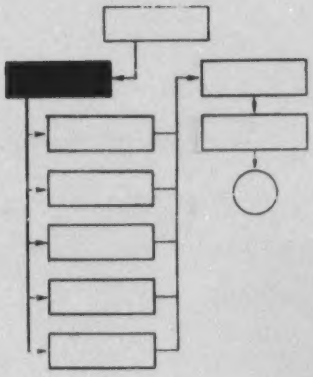
The internal evaluation group should have the ability to review the progress of the effort and to make an evaluative report of the progress to management. Evaluation is not intended to be a blame-placing activity. It is concerned with the accuracy of the problem statement, and not who is at fault. Another of the functions is to try to avoid allowing problems and tasks to "fall between the cracks," to identify problems so the manager can assign responsibility for their correction to a specific office or person.

The next section will discuss the specific procedures for carrying out the internal evaluation function. The steps in conducting internal

evaluation are shown in Figure V.1, the fold-out page at the end of this block.

2.0 PROCEDURE

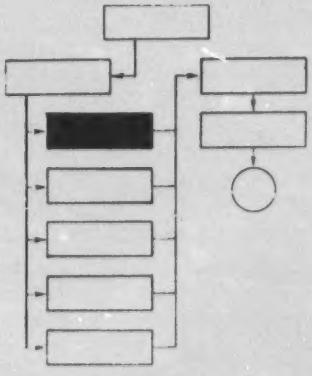
2.1 Develop Internal Evaluation Plan



Once a sound internal evaluation plan has been developed using the System Master Plan from III.2 as a basis, implementation of the plan is a relatively straightforward effort, and interpretation of the collected data is made easier. Since internal evaluation begins very early in the ISD model, planning must begin early. Much of the student and instruction data will be collected during the CONDUCT INSTRUCTION effort in Block IV.2. Those responsible for implementing the instructional management plan and conducting instruction will need to know the internal evaluation plan before they can carry out their functions.

The internal evaluation plan must include plans for collecting data from a number of sources. Following are details for planning data collection from each of these critical sources.

2.1.1 Develop Progress Evaluation Plan



In the introduction a number of specific requirements and functions of the internal evaluator were discussed. These included the collection and interpretation of data from students, instructors, project schedules,

and other sources. However, these procedures could not have been done properly if the internal evaluator had not been involved in the instruction from the time it was begun. Even though the model shows Phase V as the last phase, this is not intended to mean that this function will not be performed or planned until everything else has been done. Internal evaluators must be a part of the ISD team from the beginning.

Two important parts of the evaluation plan must be prepared before any substantial work has been done on the course. The first of these is the Progress Evaluation Plan. This Plan will state how the evaluator will prepare reports to management on the progress of the ISD effort, what is the minimum amount of information that management must have to make effective decisions, and how frequently this information must be provided. The plan should contain well summarized information and be reported as infrequently as possible in order to avoid unnecessary paperwork.

Step one is to find out from the managers what they believe their information requirements to be. Usually, the best approach is to suggest alternative kinds of information and a reporting schedule, making sure that nothing important has been left out. Some managers will identify key checkpoints in the process and delegate au rity to his subordinates to accomplish these efforts. He may want to be notified only on the exceptions to the plan; that is, when things are not working according to schedule.

Step two is for the project planners and evaluators to prepare a project time schedule and identify the sources of the information required by the manager. The schedule should identify events that are to be completed

at certain specific times. The evaluator must find out who can make the statement that any or all parts of a block are completed. If the evaluator then knows what the steps are and who can authenticate their completion, two major steps have been accomplished. He will be able to get data and report progress in a form that is most useful to the manager. Normally, any deviation from the plan should be explained to the manager and a discussion about how to eliminate the discrepancy should produce an acceptable solution. Figure V.2 is an example of part of a project schedule.

Event No.	Event Name	Activity Name	Estimated Completion	Actual Completion	Note
001	Begin Block I.1	Conduct Job Analysis	1 May		(1)
002	Begin Block I.2	Select Tasks/ Functions	1 Sept	22 Oct.	(2)
003	Begin Block I.3	Analyze Performance Requirements	1 Oct.	22 Nov.	(2)
004	Begin Block I.4	Analyze Existing Course	10 Jan	15 Feb	(3)
.					
.					
.					
019	Begin Block V.3	Revise Instructional System	15 Aug	1 Sept	(15)

Notes:

(1) Pending Approval from Command HQ; expected 15 April.

(2) Travel funds delayed; field trip not authorized.

(3) Consultant hired; unsure of arrival

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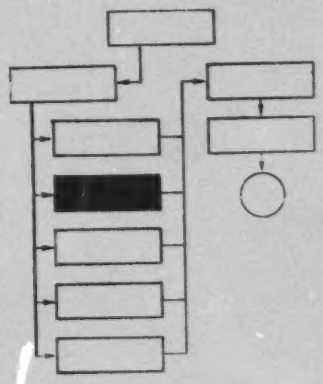
(15) Printing deadlines arranged from Command HQ

FIGURE V.2: Example of a Reporting Form to Maintain Control of a Project Schedule

This report can become very lengthy and complicated on large scale projects and will require people or a computer to keep it up to date. Several references on project scheduling and reporting are include at the end of this block. Many commands have developed their own highly refined reporting systems for similar purposes. These existing plans can be readily adapted to ISD procedures.

2.1.2 Develop Process Evaluation Plan



The second major effort of the internal evaluator in the early stages of the ISD process is the preparation of the Process Evaluation Plan. Mainly, this consists of going through the various steps of the model and identifying which of the steps and procedures in the process will be used for the course under development. The purpose of the process evaluation is to describe and document the actual developmental process for this particular instruction. These data are found in the output documentation at the end of each block. If any changes were made in the standard procedure, they should be documented. It is useful to indicate why any processes and steps were not completed as required, so that in the future those with responsibility for the course will have a better understanding of what was done.

The procedure consists of preparing a checklist for each block in the model. The primary internal steps necessary to produce the output of the block should be listed. Notations of exceptions should be requested in each block. Figure V.3 is an example of a form that might be used. The sample form also contains some example entries.

Block I.1: Analyze Job	Process Evaluation Checklist	
	Completed Procedure?	Explanation
Review Available Job Data	Yes	
Plan Data Collection	Yes	
Train Job Analysts	No	Experienced JA's avail.
Prepare Forms	No	Used existing form.
Select Sample	Yes	
Collect Data at Job Site	No	Travel funds unavailable; questionnaire only was used for task list.
Analyze Data	Yes	
Revise Consolidated List	Yes	Based on questionnaire responses only.

FIGURE V.3: Sample Process Evaluation Checklist for Block I.1.

Any suitable form can be used, or the data can be summarized from the output of each block. The principal information is the explanation of any alternative procedure followed, so that future managers will know what has and has not been done.

If such a process evaluation instrument had been used in the example of the regulation mentioned in the Introduction to this block, the negative aspects of the experience might have been virtually eliminated.

While the preparation of both process and progress evaluation plans and the monitoring of these efforts are functions that should be performed because of the organization of many commands, it is not always reasonable

to assign these functions to the internal evaluator. While the data are basically evaluative in nature, they may be more properly collected within the management system rather than in the evaluation system.

The process evaluation procedures should be extended to include the outputs from each of the blocks of the Model. Each block has a specified output which is required by succeeding steps of the Model in order to keep the development going. Each of these outputs must be examined and a judgement made as to their adequacy; they are either in conformance with the needs and requirements of the system, or are deficient because they lack certain specific identifiable features. While it is not possible for an evaluator to tell for sure whether the procedures for a proper job analysis were followed during the collection of the data, he can determine whether the output of Block I.1 is sufficient to do the work called for in Block I.2. If the output of Block I.2 is not complete, more JPMs may be developed than necessary in Block I.3, etc. The process evaluation should indicate whether the outputs of all the blocks are of sufficient clarity and quality to permit the continuation of the process. Outputs found to be lacking need to be identified and revised prior to continuation.

The ISD process generates a large number of products, just as any instructional method does. Often, it may seem that the ISD process is more complicated and requires more effort than the existing system. What tends to be disregarded is that all of the rules and procedures for operating the present system have not been carefully written down and documented. Much of the expertise lies in the knowledge and understanding of the people who are in charge of the courses. If all

of that information and procedure were gathered into a set of instructional manuals, it probably would seem at least as complicated as the ISD process does to those going through it for the first time.

Table V.2 provides a list of documentation which usually results from application of the model and can be used to develop a complete course history. On the basis of this existing data, a reasonably accurate baseline can be established.

TABLE V.2

Required ISD Documentation by Block for the Process Evaluation

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Block I.1:

1. Request for training or change in training
   a. change in requirements for existing job
   b. new job
   c. new equipment
   d. quality control
2. Definition of job
3. Description of job task analysis
4. Questionnaires with memory statement of reponses
5. Validated task list
   Conditions, cues, standards, and elements for each task selected for training

Block I.2:

1. Criteria for evaluating tasks
2. Survey sources
3. Collection forms with summary of data
4. Data analysis
5. Management inputs
6. List of tasks selected for training

Block I.3:

1. JPMs with administrative instructions
2. Field test data or JPMs

Block I.4:

1. Description of existing courses with any or all of the following that are available
   a. job analysis
   b. tasks included in training
   c. performance measures

Block I.5:

1. Job performance measures grouped by possible settings and costs for each setting
2. Selected setting(s)

Block II.1:

1. Learning task analysis
2. Learning objectives

Block II.2:

1. Entry tests
2. Pretests
3. Posttests within course tests
4. Posttests
5. Testing plan

Block II.3:

1. Assumptions about entry behavior
2. Data from validation
3. Description of target population

Block II.4:

1. Description of sequencing problems
2. Alternative sequencing problems
3. Sequenced list of objectives

Block III.1:

1. Objectives classified by learning categories
2. List of learning guidelines and learning activities

Block III.2:

1. Criteria for selecting delivery system
2. Selected delivery system
3. Selected management plan and rationale for choice
4. System Master Plan

Block III.3:

1. Description of review process
2. Selected materials with available data

Block III.4:

1. Data from development trials
2. Technical information such as:
   a. film type
   b. light levels
   c. narrator, etc.
3. Art, instruction, scripts, artwork, story boards, etc.
4. Revisions from III.5
5. Final product

Block IV.1:

1. Description of supplementary instruction given to instructors and students
2. Special training of instructors and instructor qualifications
3. Description of student population
4. Required remedial work
5. Outline of time allocation plan, facility and equipment requirements

Block IV.2:

1. Instructors' log books
2. Instructors' lists of student problems
3. Times required
4. Any deviations from course plan

The processes specified for a particular course are difficult to evaluate directly because they may occur over a long period of time and observing them may be expensive and difficult. However, it should be possible to develop a checklist which is procedurally sound that is unique to each of the blocks and which summarizes what has occurred. It could also be in the form of a questionnaire or interview. The purpose of the process evaluation is to document the authenticity of the application of the model. If the course does not work, it is much easier to revise if one can assume in the beginning that it was developed according

to a standard empirical procedure. See Figure V.4 for a sample checklist.

Checklist for Product Evaluation Block II.4 Describe Entry Behavior Component	Yes	No
1. Are administrative requirements specified? a. Length of service obligated b. Rank/Rating c. Prerequisites described d. Unit/fleet experience		
2. Are physical requirements specified? a. Vision b. Hearing c. Size d. Coordination		
3. Are academic requirements specified? a. Basic Training b. Initial E-s -- E-4 Training c.		
4. Are aptitude scores specified? a. AFQT, other b. Language, math, science c.		
5. Entry Behavior a. Arithmetic b. Welding c. Soldering d. Hand tools e. Power tools f. Other relevant requirements		

FIGURE V.4: Sample Product Evaluation Checklist for Product of II.3: Describe Entry Behavior. The information can ordinarily be summarized from documentation produced in each block.

If revisions are begun in the instructional materials but the principal problems lie in the inadequacy of the JPMs, many resources will be wasted. The evaluation of the process of ISD course development is intended to avoid useless "paper exercises". If the procedures cannot be followed by people adequately supervised and trained, there are severe problems with the requirements. Perhaps the procedures should be modified, not the people who do the work. The implications of this kind of evaluation are profound. It means that each person involved must have adequate training so he will know how to do what is expected. Further, he must have adequate supervision to resolve any problems encountered.

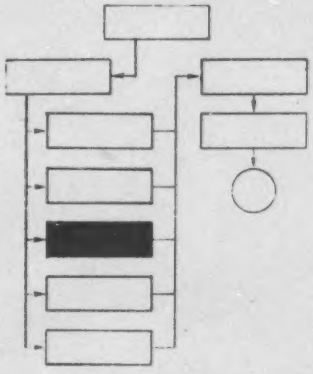
If for any reason a specified procedure cannot be followed, that fact should be documented and explained. For example, in Block I.1, ANALYZE JOB, a number of actions are specified. These include interviews with supervisors and job incumbents and the development and circulation of questionnaires. If there are no job incumbents locally and there are no travel funds, this step cannot be followed accurately. The circumstances should be adequately documented so that later decisions can take into account the constraints in effect at the time the instructional development was started.

If the constraint is properly documented, management can make more reasonable decisions about the proper course of action if, upon completion of the course, the graduates cannot perform on the job. They will know not to revise the existing course before correcting the original inadequate job analysis.

In Block I.2, SELECT TASKS FOR TRAINING, a number of safeguards have been built in to make sure that every person in the DOS who performs a given job, no matter on what ship or station, has been represented in the sampling and rating. If a significant segment of the DOS has not been sampled, then graduates reporting to those ships or stations may be inadequately trained. It was not the quality of the training, per se, but the tasks selected for training that were not adequate. In the real world, it is often necessary to proceed with inadequate or incomplete information. One can wait only so long and urge only so often, for example, that the questionnaires be completed and returned. But the discrepancy between the requirement and the results should be documented in order to avoid making a bad inference about the cause of the problem.

It is generally recognized that people are far more willing to admit their errors and shortcomings to impartial and disinterested third parties. Hopefully, the evaluators can collect the data without having to find someone to blame. There is a great difference between making a clear statement of a problem and trying to find someone who is at fault.

2.1.3 Develop Performance Evaluation Plan



The principal source of information about an instructional program's effectiveness, that is, its ability to accomplish the objectives, is from the students who receive the instruction. A clear and specific distinction is made here between the doctrine and the results. Doctrine can only be determined by experts in

the field. Students are not very useful in this area. Whatever the doctrine, good or bad, accurate or inaccurate, the students can provide information on what they learned. Student performance data can be collected only from students. SMEs cannot supply it. No revisions should be undertaken to correct methodology without adequate student performance data. Revisions take time and money and should not be done unless there is good evidence that the revisions are necessary. This rule does not apply to revisions undertaken to correct errors in doctrine.

There are four areas that are important to consider in evaluating students:

1. External requirements
2. Entry skills
3. Performance on internal tests
4. Time required to complete instructional units

For all of these areas, appropriate forms should be used for collecting the data.

2.1.3.1 External Requirements

Students have brought with them their service records that contain a variety of useful information to the internal evaluator: the scores on their personnel tests, their education and training background, prior courses taken, correspondence study, hobbies, and perhaps other useful information. From such data, one can determine the student's qualifications for the instruction.

Before the student begins the instruction, he can be interviewed or asked to complete questionnaires which can have further implications for

course designers. It is fairly easy to design a form that will contain all the useful information from the student's prior history; all of the items mentioned in Block II.3. This form is not significnatly different from a job application blank.

Students probably should never be rejected from a course for failing to meet assumed or specified prerequisites until real data from course operations confirm or reject the prerequisite criteria. There is no way of knowing that the prerequisites are actually necessary until it can be shown that students having the prerequisites tend to succeed while students not having them tend to fail to reach mastery in a reasonable time during instruction.

2.1.3.2 Entry Skills

If students have, or do not have, the external prerequisites, they may still have or not have the entry skills. The entry skills determination is important to know whether to place the students at the beginning or provide preliminary instruction. Entry skills are very specific, measureable behaviors that have been determined, through the process of analysis of learning requirements, to be basic to acquisition of subsequent knowledge or skill in the course. Pretests are used to decide whether to start the student in an advanced unit. Since some students will know much more about the subject matter than others, they may be advanced. This process is described in Blocks II.2 and II.3.

The determination of entry skills is made on the basis of the student's ability to answer questions or demonstrate adequate performance on the knowledge and skill needed prior to instruction. It is not an aptitude

or intelligence test, but an instruction-related test based on applicable learning objectives.

In some schools, it is possible to ask students whether or not they know anything about the instruction. If they say they do not and their service record confirms the claim, it is probably reasonable to assume they are right. If they say they do know something about the subject, it is probably worthwhile to administer the pretests to determine how much. Usually anything the student already knows should not be taught him again.

There is a difference between a pretest and a test of entry skills. The pretest is to determine what the student knows about the specific unit to be studied. The entry skills test is to determine if the student has mastered skill or knowledge that is basic to the new instruction but is not intended to be a part of the instruction. In this situation, use the test developed for this purpose as described in Block II.3. Normally, these tests will be administered by the instructors who have been designated for that assignment. Keep in mind that the purposes of the internal evaluator and the purposes of the instructional staff are not exactly the same.

2.1.3.3 Performance on Within-Course Tests and Posttests

The internal evaluator will not have to be so much concerned about development of special tests or evaluation instruments as he will the systematic collection and accumulation of the data collected routinely during the instruction. In Block III.5, the validation process yielded useful information about the instructional materials based on the tests administered during student trials. At some point the early trials or

iterations of a course become the baseline data. Enough data is collected to be able to say what the results were when the course started. Everything else can be measured from that point.

There are many sources of performance data in the ISD model. Most of this data is collected in Block IV.2: CONDUCT INSTRUCTION. The internal evaluator uses the same performance data to evaluate the instruction that the instructors or monitors use, to evaluate the students. It is simply used in a different manner. Block III.5 presents an approach to the collection and display of performance data for a number of students on a number of objectives.

Technically, in this section of this block the concern is with the evaluation procedures for students, and not for the instruction as a whole. The instructional staff or the test administrator will have administered the proper test to the students and decided which of the students met the requirements and which required additional instruction. Recording this information for each of the major subdivisions of the instruction can be most helpful. Probably the greatest benefit is to allow students to continue in the program regardless of their test score on the go/no-go tests until it has been clearly established whether those who are "go's" can continue to do the work and those who are "no-go's" cannot.

Following instruction of any kind, there should be a posttest. Posttests may be given on practice exercises, lessons, modules, units, or complete courses. They should be as authentic as possible; that is, they should be the actual task or close approximations.

2.1.3.4 Time Required to Complete Instructional Units

One of the more valuable types of data that can be collected by the instructional staff is the amount of time required to complete each of the objectives, or instructional units. While there may be some relationship between successful performance and the amount of time, the major value of the time data comes when alternative means of reaching the objectives need to be compared with the original plan. Some instructional methods are virtually equal in effectiveness, but they are unequal in time required to complete them. Consider the block scheduled lecture approach where each student spends the same amount of time in the presence of instruction. There, students spend approximately equal time in instruction, not including the outside time they spend studying. If another method was considered, it would be useful to have the time data for the other method to make the comparisons.

Student time cards can be prepared if there are facilities for using them, and the time data summarized off the time cards. Sometimes it is possible to use sign-in sheets and student-kept time logs. The latter are not so accurate as the former, but with enough students they are likely to serve the purpose quite well, particularly on long courses. Time records, except those requiring expensive equipment and those kept in a very tightly controlled setting are not likely to be precise. But, like so many other kinds of measures, they may be the best available and will have to be used.

Time should be kept on the smallest practical unit of instruction. Also, wherever possible, time should be limited to actual instruction,

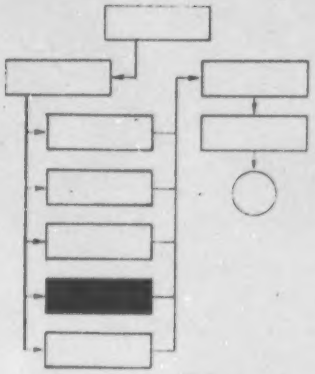
independent of waiting, transportation, administrative matters, and other interferences, except where the unused time is an integral part of the course as designed. If students must spend so much time doing administrative duties and would have the same obligation under any other form of instruction, there is little point in counting those duties as instructional time. If the time is to be recorded and kept by the student, it is imperative that a system be established to collect the student records at frequent intervals.

Perhaps students must turn in their time sheets prior to getting new materials, passing to the next unit, leaving on Friday, or getting a new chow card. This turning in of time cards and time sheets will not happen without careful management. Often people mistake the intention of the time records and believe that it is a way "the Man" has of checking up on what they are doing. Time, collected as a part of an evaluation effort, should not be used for administrative purposes. If it is, the records will be even less accurate than they would be if students keep them without this threat.

Time is probably best recorded on a "per unit of achievement" basis rather than on a calendar basis. It is not of great value to know that on Thursday, Jones spent forty minutes watching a film. It is more important to find out how much time Jones spent watching film to accomplish each specific objective.

The kind and quality of the time records kept will depend on the emphasis placed on efficiency by management, the availability and assignment of people to do the job, and the ability of the course manager to secure the cooperation of the students, particularly if they will be keeping their own time records.

2.1.4 Develop Plan for Collecting Information From Students



Students can be the source of useful information about the perceived quality and preferability of instructional events and materials. Usually, this information is collected on questionnaires and rating scales. Typically, the questionnaires and rating scales are prepared in advance for each of the events and materials to be rated. Ratings can be on an absolute basis:

1. What did you think of the film?
2. Which did you like better, film A or film B?
3. Would you prefer to practice longer before you take the test, or did you have enough time?

And other questions of that nature. Some examples of questionnaires and rating sheets are included in Appendix A.

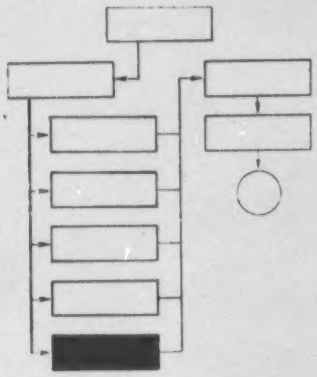
Students can report on problems they encounter with the instruction, the instructors, evaluators, or other materials and people associated with the instruction. These reports are best prepared on a regular basis and as close in time to the event reported upon as possible in order to avoid forgetting of critical details. The method of critical incidents is particularly suitable for obtaining specific positive and negative incidents in the instructional program. Summarizing these incidents can provide good information about the course. If the incidents are to be written, some consideration should be given to the ability of the trainee to compose narrative prose.

Students can be used to rate instruction, their instructors, and their classmates. There can be no relationship between the student's rating of the instructor and his grade in the class. Ratings must be carefully collected. The student should not be identified as the rater. Further, the ratings should be seen and presented in a constructive manner; that is, they should not be seen by the student as a way to "get back" at an unpopular instructor. The purpose of ratings of instructors is to find specific points in the instructor's behavior which can or should be changed or emphasized. If he is doing something right, it is good that he knows that, and the same applies if he is doing something wrong.

Probably the greatest difficulty with rating forms is the tendency to include questions on the rating form that those who use it are not qualified to answer. Just as people untrained in medicine should not be asked to rate the health of an individual, students should not be asked to rate the instructor's knowledge of a subject matter. The ratings should bear a close relationship to what the student has had the chance to observe, and the ratings should be based on that observation. It is not a good idea to have students try to compare instructors on a relative basis.

Students can tell whether they like, dislike, or are indifferent to instruction they have recently experienced. They may not be able to say <u>why</u>! What students should be asked are specific personal experiences and their feelings or opinions about these experiences. Granting student preferences, all other things being equal, probably will increase morale. Further, the filling out of attitude scales and questionnaires has been known to reduce anxiety in courses that historically have created much concern and anxiety.

2.1.5 Develop Plan for Collecting Information from Instructors



Instructors are in a unique position to provide much valuable information about the instruction. One of the more important kinds of information that can be obtained from instructors is doctrine. Rarely will instructors be assigned to a course if they have no knowledge of the doctrine and content being taught. As many people who have taught know, many problems are identified in the instructional materials and procedures when they are used with students. Students have a way of asking "How" or "Why" to ideas and procedures taken for granted by those in the field. Answering these hard questions has helped a number of instructors learn much more about their own discipline by having to explain clearly to students.

Another source of data which can come only from instructors or test administrators is the performance of students on the objectives being taught. It is normally the instructor or test administrator who gives the performance tests or other measures to determine when the students have mastered the objectives. Further, the instructor can supplement this hard data with ratings of students on other important variables, including motivation, application, effort, and ability to follow instructions.

If the instructors are asked to keep logs or notes on specific problems which occur in the course, these can become valuable when analyzed. The very act of recording often focuses attention on the problem and

solutions emerge from conversations among those familiar with the problems. If instructors are asked from time to time to prepare critical incidents highlighting particularly successful and unsuccessful instructional events or procedures, the analysis of these incidents can yield valuable information. The analysis can perhaps be better used to improve instruction than can any other kind of information.

In many cases, it will be possible for the instructor to keep reasonably accurate time data. He will be able to record the beginning and ending time for all students on each objective. While this data collection takes time, it can be some of the more valuable information accumulated. Ordinarily, instructors will be able to keep this kind of time data only in those situations where the students are self-paced, or individually scheduled on the objectives in question. It is extremely difficult to collect accurate time data on groups, unless one is simply recording hours of "exposure."

The more detail that can be included with time data, the better. If the instruction involves use of manuals, tools, training devices, laboratory equipment, presentations, and practice exercises, these times should be kept separately. Later, times can be compared to the performance data and the student impressions of the value of the different experiences.

Often it is desirable for instructors to observe and record evaluative ratings of peers as they go about their jobs. This information, if provided in the form of feedback, can be helpful in improving instructor performance.

EXAMPLE

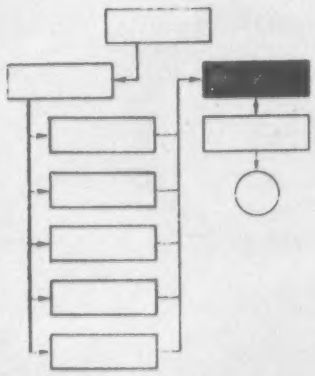
> In the administration of performance tests, if the instructor is asking the same questions and requiring the same performance of all of the trainees, this information may quickly spread among the trainees who may try to "beat" the system. The instructor may not have intentionally followed the same procedure or may be unaware that he is giving the answers away by habitual practices.

Observation of the instructor by other informed instructors can be helpful. Care should be taken not to ask questions on the questionnaire which cannot be rated by observers, e.g., "Knowledge of subject."

Internal evaluators may find some of these data much more useful than other data. The value of the information will be determined in part by the kinds of problems that the course is experiencing. The problems will be different for old instruction that has had most of the problems removed from it than for new instruction that has only recently come under the scrutiny of the evaluators. If the course has already been determined effective, the principal concern may be the collection of data that will increase efficiency. It may be that more students could be sent through the program without increasing the number of people required to manage it, or it may be that certain people involved with the course can be reassigned when the course becomes more efficient.

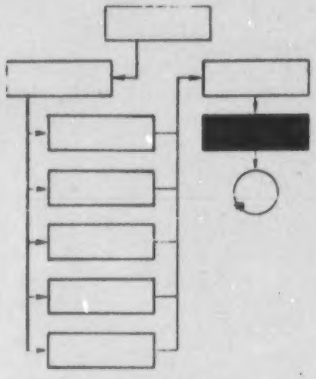
2.2 Conduct Internal Evaluation

If the internal evaluation has been appropriately planned; if all forms, tests, instructions for use, and trained personnel are available, the actual conducting of the evaluation is largely a matter of carefully



following the plan. However, critical steps in a program do not "just happen." Prepare for the unexpected. Be prepared to modify or add to the plan as instruction proceeds. Any deviations from plan must be carefully documented along with the reasons why the changes were made. Collecting too much information costs time and money. But not collecting essential information will cost even more.

2.3 Interpret Data and Make Recommendations



The primary product of this block is an internal evaluation report (INER). This report is a summary statement, referencing all pertinent information resulting from the procedures followed in this block, of the internal evaluation findings, their interpretation, and specific recommendations for revision of the instruction. A summary statement of the previous sections of this block should be included in this report. Details of appropriate display and interpretation of data follows.

2.3.1 Display and Interpretation of General Data

After the evaluation data has been obtained and tabulated in a usable form, it is time to begin making interpretations and drawing conclusions. A major function of the internal evaluation process is to suggest what the data collected might mean; that is, what implications it might have for Block V.3: REVISE SYSTEM. Those who are well trained in methods of educational and training research will be better able to manipulate the data in a number of ways that will provide specific cause and effect

relationships, and tentative conclusions. If such people are available in your command, it could be very useful to involve them in the development of data analysis and interpretation studies.

If researchers are not available, the next best method is to tabulate the data by hand in useful ways. First, the data should be categorized by the personal characteristics of the students; the measures and tests taken before they arrived at the school. These include the following:

Age, length of service
Prior training in this area
Experience in this area
Hobbies and personal interests (if applicable)
Scores on AFQT and other Placement tests

These can be categorized and put onto a data sheet large enough to contain all of the background information and all of the information to be recorded about the student at the school. Figure V.5 provides a suggested form of a data sheet which would be useful for hand tabulation. If you have a machine capability, you should consult with the machine operators to be sure that the data sheets you prepare are compatible with the machine format. Figure V.6 displays a summary sheet for coded data.

In Section 2.2, the performance of the student at the school was carefully recorded. If possible, the student's actual scores on the performance measures should be reported here, not just whether he was a "go or no-go". While the "go" is enough for the student, the evaluator can make good use of the actual scores to determine the instructional efficiency of the modules and units. It is true that some performance measures do not yield a number score, and those will have to be recorded as go/no-go.

	Student No.			
	1	2	3 . .	4
1. Age (years)	21	18	19	30
2. Length of Service (months)	20	4	16	60
3. Years of Military Schooling	1	1/2	1/2	2
4. Training in This Area (+ or -)	+	-	-	+
5. Hobbies or Personal Interest in this Area (+ or -)	+	-	-	+
6. Work in This Area? (+ or -)	+	-	-	+
7. School Performance				
a. Entry Test Score (0-10)	9	3	10	10
b. Modules/Units Scores (total; 50=pass)				47
1 2 3 N				
c. Modules/Units Times (total hours)	80	90	100	85
1	10	12	14	9
2	10	12	14	9
3	9	7	9	8
N	10	8	[illegible]	9
8. Date Departed	6/74	6/74	6/74	6/74
9. Assignment to DOS (+ or -)	+	-	+	+
10. Follow-Up Information				
a. Supervisor Ratings (1-5)	4	4	5	5
b. Performance Test Scores (0-25)	22	20	24	25
c. Peer Ratings (1-5)	3	2	5	5
d. Promotion Record (numbered promotions)	0	0	0	1
e. Safety Record (1-5)	1	5	4	5

FIGURE V.5: Sample Coded Data Spread Sheet

Summary Sheet of Data

1.	Age	range	-	years	$\bar{x}$ =
2.	Length of service	range	-	mos	$\bar{x}$ =
3.	Years of military schooling	range	-	years	$\bar{x}$ =
4.	Training in this area	yes	__%	no__%	
5.	Hobbies or personal interest	yes	___%	no__%	
6.	Work in this area	yes	___%	no__%	
7.	School Performance				
	a. Entry test score	range			$\bar{x}$
	b. Modules/Units scores (total)	range			$\bar{x}$
	1	range			$\bar{x}$
	2	range			$\bar{x}$
	3	range			$\bar{x}$
	N	range			$\bar{x}$
	c. Modules/Units Times (total)	range			$\bar{x}$
	1	range			$\bar{x}$
	2	range			$\bar{x}$
	3	range			$\bar{x}$
	N	range			$\bar{x}$
8.	Date Departed				
9.	Assignment to DOS	yes	___%	no__%	
10.	Follow-up				
	a. Supervisor ratings	range			$\bar{x}$
	b. Performance Test Scores	range			$\bar{x}$
	c. Peer ratings	range			$\bar{x}$
	d. Promotion record	yes	___%	no__%	
	e. Safety record	range			

FIGURE V.6: Summary Sheet of Data

One output of this block will be the completely filled in data spread sheets on students. These will go to the next block, V.2: EXTERNAL EVALUATION. They should be retained permanently or until such substantial changes have been made in the course that making comparisons with the original course is no longer possible. By that time, all of the scores should have been tabulated and included in the data analyses to be reported either on cards, tape, or in summary form. Follow-up data on each student also should be recorded on this form.

Block III.5: VALIDATE INSTRUCTION, provided a procedure to use for deciding whether instruction was adequate. Generally, these same procedures should be followed for the entire course in order to see whether the course is improving and where additional work needs to be done. By adding the collected time data and the additional performance data obtained from each cycle or group of students going through the program, gradually a considerable amount of evidence will be gathered. This evidence will either confirm the internal quality of the course, or point out areas in which revisions may be required.

When is the course good enough? This is one of the more difficult questions that the internal evaluator will have to deal with on a daily basis. It is the same type question as: "How much safety is enough?" The ideal situation is that there be no accidents and that there be no school failures. Up to now, and probably for a while in the future, not enough is known to prevent all accidents nor to design "Zero Defects" instruction. What can be said is that the goal is zero defects in instruction, consistent with time and resource availability.

Block I.2: SELECT TASKS/FUNCTIONS provided a list of tasks for which training was required. Since this task list was very carefully screened for unnecessary, outdated, and nice-to-know information, it is reasonable to say that students should reach an acceptable criterion on all tasks selected for training. That is, no student may go to the fleet or to duty without having passed all of the internal performance measures. This is a good rule and should be applied consistently in training. There will, of course, be exceptions. For example, if a unit or fleet is known to have a FOJT program which is intended to move trainees rapidly from their school performance to acceptable command performance, there might be enough overlap in the two areas to permit some leeway in deciding when students were ready to leave.

But, if there is no training program in the receiving command and the student will have to perform well the day he arrives, the standards set in the school must be high and consistent, and no one should leave until he has mastered the objectives. However, all of this must be thought about in the context of local command requirements and the availability of a particular DOS to the service. Sometimes more people, even though only partially trained, are required than can be supplied. This will put a great strain on the training program. However, if training has been properly designed, one of the features it could have is that of rapidly increasing or decreasing the number of graduates without requiring a long lead time. To establish across-the-board criteria for all schools under all conditions is not reasonable and may not even be possible.

It is not the internal evaluator's job to decide which students should pass and which should remain for additional training. His job is to try

to find out if the instruction has met the requirements expressed in the objectives, tests, and other evaluative procedures. This is a very difficult distinction to make since most past experience has been concerned with the making of decisions about students.

In many courses prepared in accordance with the principles of ISD, students will have the opportunity of being retested several times on each of the major milestones of the course, at least, until the local training installation has gained enough experience to know whether there is a continued payoff for this retesting procedure.

2.3.2 Display and Interpretation of Performance Data

A data sheet similar to the one in Figure V.7 should be prepared for each 25, 50, or 100 students who go through the course. The example data are assumed to have been gathered from a course evaluation in which the following procedures were used:

1. Students were admitted to the program without regard to whether they met the prerequisites.
2. All students worked through the course in the same order at individual rates.
3. Students proceeded through the course regardless of the scores they made on entry, pre- and posttests. For this trial no students were required to repeat any lessons. Those who failed the JPM were required to restudy all or parts of the course but those data are not reported here.
4. Units and lessons within units were roughly sequential, that is, students mastery of material in Unit I lesson 3 was partly dependent on their mastery of material in lessons 1 and 2 of the unit.

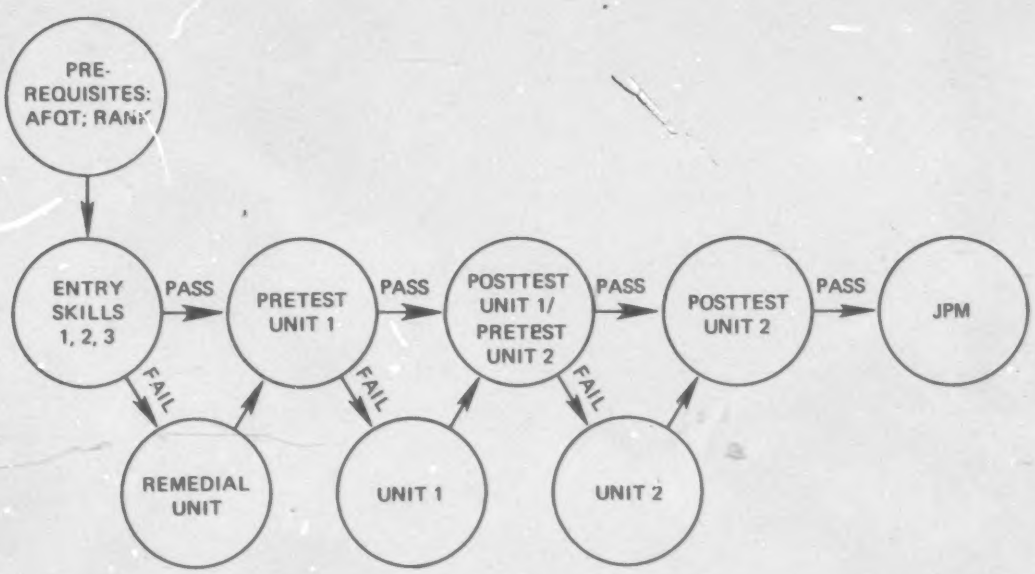
Student	External Criteria AFQT	External Criteria DOS	Entry Skills Test	Unit I Pretest	Unit I Posttest 1 12*	2 10	3 6	Total 28	Unit II Pretest	Unit II Posttest 1 10	2 10	3 8	4 6	Total 34	JPM
01	74	E-5	70	4	10	10	4	24	2	8	9	7	6	30	P
02	63	E-5	46	4	10	10	5	25	3	9	10	7	6	32	P
03	34	E-4	49	1	9	5	4	18	2	10	8	5	5	28	P
04	57	E-5	56	1	8	8	3	19	1	5	7	3	4	19	P
05	87	E-5	40	2	12	9	3	24	0	8	6	4	5	23	P
06	78	E-5	50	3	10	9	4	23	1	7	5	6	6	24	F
07	61	E-5	38	0	5	6	3	14	1	7	9	5	5	26	P
08	65	E-4	53	1	7	5	0	12	2	6	5	7	3	21	F
09	40	E-5	21	1	7	7	3	17	2	7	8	3	4	22	P
10	35	E-4	20	0	8	7	1	16	0	5	6	7	2	20	F
11	56	E-4	59	1	9	8	2	19	0	6	4	4	3	17	F
.															
.															
.															
100	64	E-4	65	6	11	10	5	26	5	9	10	8	6	33	P

* Number of items in CRT

FIGURE V.7: Student Performance Data Sheet

5. The entry test contained items which measured skills and knowledge needed by students to learn the course content but which was not taught in the course. For example, the course might involve the solution of percent and rate problems. The entry skills test would therefore contain arithmetic items which measure these necessary skills.
6. The pretests contained items from each posttest in either identical or simplified form.
7. Scores on the JPM occurred naturally in go/no-go form or they were reduced to go/no-go categories using guidelines provided in Block I.3.

The following diagram shows the relationships between the various parts of the course:



Placement of the course components shows, from left to right, the order in which the data was gathered. The arrows indicate relationships between the components that are of interest to the evaluator.

The important evaluation questions that can be answered by the data are listed below and then discussed in turn.

1. What are optimal cut-off scores for the CRTs of Unit 1 and Unit 2?
2. Are the prerequisites valid in the sense that they predict success and failure in the course?
3. Can the pretest provide information useful in placing different students at different levels of the course?

In order to answer the first question, "What are optimal cut-off scores for the CRTs in units 1 and 2?", one must look at the relationship between the last unit (in this case, unit 2) and the JPM. Do this by breaking the unit 2 CRT scores into two or more categories. Then, using the data from Figure V.7, construct a table which shows how many people in each CRT category passed or failed the JPM. The number of categories chosen is arbitrary except that the more categories used the more students needed. The table shown in Figure V.8 has four unit 2-CRT categories, and within each category it shows how many students pass or fail the JPM. It is apparent that the minimum acceptable score for the unit CRT should be either 30 or 25. This is because 93% of the students who attain 30 or better and 70% of those who get 25 or better pass the JPM. Which is optimal depends on the nature of the JPM. If it is an individually administered costly device, then the higher cutoff score would

be chosen. If it is easily administered and readily available, then the lower score could be used. Of course, other considerations might also enter into the decision.

		Below 19		20-24		25-29		30-34		Total
		N	%	N	%	N	%	N	%	
JPM	Pass	2	22	6	33	23	70	37	93	68
	Fail	7	78	12	66	10	30	3	7	32
	Total	9	100	18	100	33	100	40	100	100

FIGURE V.8: Numbers and Percentages of Students in Each Unit 2 - CRT Score Category who passed or failed the course JPM.

One limitation of the procedure used in the example in Figure V.8 is that no clear information is provided concerning which lessons need to be restudied by students who fail to reach the cutoff score. Student 06 in Figure V.7 has lesson scores in Unit 2 of 7/10, 5/10, 6/8 and 6/6. Should he re-take the first three lessons or only the second one? Obviously the answer could be provided only by determining cutoff scores for each lesson. If the lessons are fairly short and if they appear to be of equal importance the overall unit score should be used because it is probably more reliable (consistent) than the individual lesson scores. If it was necessary to determine cutoff scores for each lesson, then the cutoff score for lesson 4 should be dependent on having mastered

the material in lesson 3. Otherwise the cutoff score for lesson 3 should also be determined with the JPM. These principles also apply to the determination of cutoff scores for lessons 2 and 1.

The cutoff score for Unit 1 is established according to the same procedures described above except that the Unit 2 cutoff score is used instead of the JPM since we are assuming that mastery of Unit 2 is dependent on mastery of Unit 1. Figure V.9 shows the kind of data that can be expected.

	Below 13		14 - 18		19 - 23		24 - 28		Total
Unit 2	N	%	N	%	N	%	N	%	
CRT Pass (25 & up)	10	50	5	50	29	78	29	88	73
Fail (below (25)	10	50	5	50	8	22	4	12	27
Total	20	100	10	100	37	100	33	100	100

FIGURE V.9: Numbers and Percentages of Students in Each Unit 1 - CRT Score Category who Passed or Failed the Unit 2 - CRT

Again there are two choices for a cutoff score 19 and 24. Which of them is chosen may be determined by other factors.

The answers to the other two evaluation questions can be arrived at in a similar fashion. To answer the question, "Are the prerequisites valid?", construct a table similar to those in Figures 8 and 9 for each prerequisite. Tables for this question are likely to yield less clear-cut results than those in the examples. Suppose you had 50 E5s

and 50 E8s in your sample and 38 (76%) of the E5s passed the JPM after the course, but only 30 (60%) of the E8s passed. Does this result mean that all E5s are more likely to be successful than all E8s, or could the 16% difference in success rate be due to chance? That is, if other samples of E5s and E8s were used would the E5s always have a higher success rate? In order to answer this question you need to consult someone who has training in statistics if you do not have such capabilities yourself.

The optimal use of a pretest in placing students within the course depends on the number of entry points and the length of the CRTs associated with them. In the current example there are only three decisions that can be made with the pretest: place the student in Unit I, place him in Unit II, or administer the JPM to him with no further training. The pretest could have two subtests, one for each of the two regular units. A student who passed both would go directly to the JPM. In the present example the subtests for Units 1 and 2 could be identical with or alternate forms of the unit posttest CRTs. Passing scores for them would have been established in the procedures previously described and no further work would have to be done on them. If there were many entry points into the program or if the CRTs were very time consuming it might be reasonable to construct short tests that could predict performance on the CRTs. In that case, of course, each subtest would have to be paired with its unit CRT and a table constructed to determine whether it did in fact predict properly and to determine its cutoff score.

2.3.3. Some Additional Evaluation Designs

In all discussions of validation and evaluation up to this point, you have been advised to use what is called a one-group pretest-posttest design.

In using it, students are located who have low scores on a pretest, training is administered, and then a posttest is given to them. If scores on the posttest are substantially higher than those of the pretest (and/or meet some performance standard) you conclude that the training was reponsible for the change. This conclusion is generally reasonable when the period of instruction is short and the tests are reliable JPMs. There may be situations where such a conclusion is open to doubt. It may be that simply taking the pretest provided sufficient practice for students to improve their scores on the posttest. Or it may be that the pre-posttests are not reliable.

Consider an extreme example in which the pretest asked students to list the outcome of a series of ten coin tosses. In a relatively large group the average score will be five, but some students will have a score of zero. If the test is administered a second time they are most likely to have an average score of five since there is no reason for them to be "unlucky" twice. If one wins unaware of the value of the tests and believed that some instruction occured between them, he might conclude that the pre-post differences were due to instruction.

All tests that are not perfectly reliable contain chance elements that tend to make initially low-scoring groups have higher scores the second time the test is taken. These same chance elements tend to make initially high group scores lower the second time; however, these individuals usually are eliminated from the subject sample. Therefore, you are rarely if ever led to the mistaken conclusion that the instruction made the subjects less competent than before.

There are a number of other reasons that might cause doubt whether the increase in posttest scores was due to the instruction. In order to eliminate all of these possibilities, use a design that employs a control group. That is, have one group (the treatment group) take the pretest, undergo instruction, and take the posttest. The control group only takes the pre and posttests at the same times the first group takes them. Ideally you should assign students randomly to the groups, with all of them being low on the pretest. If you then observe that the treatment group has higher scores on the posttest than the control group, you can conclude that the instruction provided was responsible for the increase.

Sometimes the one-group-pretest posttest design is simply incapable of answering the evaluation questions you want to ask. Suppose you have designed a course in land navigation which contains an entry test, a series of AV lessons, an audio cassette exercise, a simulation game, a field exercise and a JPM. The evaluation question might be, are all elements of the course necessary to produce satisfactory performance on the JPM? One relatively simple design that will provide at least a partial answer to the questions follows: After giving the entry test, assign (randomly if possible) students to one of the training conditions given below:

1. AV lessons, JPM
2. AV lessons, Audio cassette, JPM
3. AV lessons, audio cassette, simulation game, JPM
4. AV lessons, audio cassette, simulation game, field exercise, JPM

Suppose you found the following percentages of passes on the JPM in the four groups, 64, 77, 79, 91. You would probably conclude that the simulation game added little to the course and that it could be eliminated with-

out loss of effectiveness. The design above is based on the assumption that instruction in the course is cummulative so that it would not make sense to ask, for example, whether the audio cassette and field exercise combination was as effective as any other combination. If this assumption is not reasonable and you wanted to find out the best combinations and the four elements you would need 16 groups (2x2x2x2).

Evaluation designs can become very complex, and in addition, often require sophisticated statistical techniques for proper interpretation of their results. If you become convinced that, for a particular evaluation situation, the one-group-pretest posttest design may give misleading results or is not capable of answering the questions you want to ask, you may need to employ the services of an evaluation or research specialist or get additional training in that area.

3.0 OUTPUTS

The outputs of this block should consist of the following:

3.1 Products

An internal evaluation report (INER). This report is a summary statement of the internal evaluation findings, their interpretation, and specific recommendations for revision of the instruction (see Table V.3).

3.2 Other Documentation

Supporting information including, as a minimum, the following:

1. Complete student records containing all pertinent information on all students who entered the instruction being evaluated.

SAMPLE SUMMARY OF INTERNAL EVALUATION REPORT
FOR A COURSE IN OH-58 HELICOPTER REPAIR

CODED DATA SPREAD SHEET	Student Number									
	1	2	3	4	5	6	7	8	9	10
1. Age (years)	18	22	21	19	10	19	26	31	19	19
2. Length of Service (months)	3	24	12	6	16	2	52	65	4	6
3. Years of Military Schooling	0	.5	0	0	.8	0	2	3.5	0	0
4. Training in This Area (+ or -)	-	+	-	-	-	+	-	-	+	-
5. Hobbies or Personal Interest with This Area (+ or -)	+	-	-	-	-	-	-	-	+	-
6. Work With This Area (+ or -)	-	+	-	-	-	+	-	-	+	-
7. School Performance										
A. Entry Test Score (total; 50 possible)	33	44	40	03	40	42	08	41	38	09
B. Unit Scores										
1. (total; 22 possible)	13	22	16	7	18	20	8	17	14	4
2. (total; 44 possible)	21	33	28	19	26	34	17	28	24	19
3. (total; 36 possible)	27	32	30	25	28	34	25	28	27	23
4. (total; 24 possible)	19	24	22	18	21	24	18	20	18	12
5. (total; 30 possible)	16	22	19	12	17	23	10	19	16	9
6. (total; 36 possible)	27	33	31	28	31	34	20	30	26	14
8. Date Departed	6/75	6/75	6/75	6/75	6/75	6/75	6/75	6/75	6/75	6/75
9. Assignment to DOS (+ or -)	+	+	+	+	+	+	+	+	+	+
10. Follow-up Information										
A. Supervisor Ratings (1-5)	5	5	5	3	4	5	3	5	4	2
B. Performance Test Scores (0-25)	22	24	22	18	22	25	19	23	22	13
C. Peer Ratings (1-5)	5	5	5	4	4	5	4	4	4	2
D. Promotion (no. of promotions)	1	1	1	0	1	1	1	1	0	0
E. Safety Record (1-5)	4	4	4	4	3	3	4	4	4	3

TABLE V.3 : Sample Summary of Internal Evaluation Report

2. The degree to which the ISD process was followed, making certain that any exceptions are noted and explained. The evaluation of the outputs on a block by block basis.
3. The developmental time and resources used to develop the course, including unique and unusual costs or savings brought about by the specific procedures followed.
4. A profile of the entry characteristics of the students, in terms of their personal characteristics, test scores, selection criteria, and other personal history; and, the specific performance requirements that had to be met by them prior to beginning the instruction in the main part of the course. A discussion of the planned vs. actual entry behaviors of the students.
5. A completely detailed, and summarized, presentation of student performance data, organized by major objective, or tasks. Also included should be the summaries of student questionnaires and other data provided by students.
6. A summary of the major inputs from the instructors, including any analyses made of the critical incident reports or the questionnaires completed by the instructional and testing staffs.

It is necessary to decide the regularity or frequency of the internal evaluation report for any course; that is, whether the reporting period should be based on numbers of students, or should it be sent at regular times. If it is to be used principally for reporting results, it will

probably be necessary to submit it regularly. If it is principally to be used for decisions about revising the course, it can be submitted following the completion of the course by a significant number of students. Earlier reports probably should be based on fewer students than later reports. Any serious problems probably will occur early and should be given immediate attention. Less serious problems should be well-substantiated by a larger number of students before revision is begun.

EXAMPLE

These data suggest that:

1. Neither age, length of service nor years of military schooling relate in any systematic way to performance in school or on the job. Therefore, these administrative requirements are not relevant to training and it is recommended that they be dropped.

2. Units 2 and 5 reflect much lower average scores than the other units. Additional instruction, or additional time for the same instruction, will be considered.

3. Two of the three individuals who failed the entry test performed satisfactorily in school and on the job, even though they had no remedial training. The entry test is therefore too difficult and should be modified.

APPENDIX A

EXAMPLES OF DATA FORMS AND QUESTIONNAIRES

EXAMPLES OF DATA FORMS AND QUESTIONNAIRES

Directions: Observe the behavior of the learner in the classroom and keep notes and frequency counts of what happens in each of the following categories. When the observation period has been completed, use your notes and frequency counts to complete this form. Upon completion submit to the Project Officer for internal evaluation. This Project Officer may ask for your assistance and for clarification during the Analysis phase of this evaluation.

A. Evaluation _____
NAME OFFICE TEL.

B. Length of time for observation: _____

C. Location of observation: _____

D. Title of Learning Block: _____

_____

E. Did this observation cover the entire block? _____

F. If not, which part? _____

G. Instructor: _____
NAME OFFICE TEL.

H. Time of day: _____. I. Number of students; _____

SECTION I. - THE LEARNER

(answer in terms of per hour) (If not observed enter N/O, if not applicable, enter N/A)

____1. How frequently did student questions indicate a lack of knowledge of the objective required?

Never	Seldom	Often	Frequently	Constantly

__2. How frequently did student questions/comments indicate they were aware of the objective but didn't understand it?

Never Seldom Often Frequently Constantly

___3. How frequently did student questions/comments indicate that they understood the objective but didn't see where it fit into the job they were learning?

Never Seldom Often Frequently Constantly

___4. How frequently did student questions/comments indicate that they did not understand how much assistance they could expect to receive when performing this part of their job?

Never Seldom Often Frequently Constantly

___5. How frequently did student questions/comments indicate that they did not know which tools they would be allowed to use on the job?

Never Seldom Often Frequently Constantly

___6. How frequently did student questions/comments indicate that they did not know what materials they would receive to do the job?

Never Seldom Often Frequently Constantly

___7. How frequently did student questions/comments indicate that they did not know which references they would receive on the job?

Never Seldom Often Frequently Constantly

___8. How many times while performing did learners fail to use any of the materials/tools/references/etc. they could use on the job?

Never Seldom Often Frequently Constantly

___9. How many times while performing did the learners use a material/tool/reference/etc. that they would NOT receive on the job?

Never Seldom Often Frequently Constantly

10. How frequently did student questions indicate that they were confused as to where a classroom required behavior fit into the job-at-large?

Never Seldom Often Frequently Constantly

11. How frequently did student questions about a test indicate that they did not relate the classroom activity with the job performance requirement of the test?

Never Seldom Often Frequently Constantly

12. What percent of student failure, on a test, indicated a lack of ability to transfer classroom learning to job-oriented requirements in the test?

Never Seldom Often Frequently Constantly

13. What percent of the class had a great difficulty in starting the test?

Never Seldom Often Frequently Constantly

14. How frequently did the learner require tools, equipment, references, etc., that he had used in the classroom if they were not supplied with the test?

Never Seldom Often Frequently Constantly

15. What percent of the learners finished the test within the allotted time?

0% 1-10% 11-50% 51-80% 81-100%

16. What percent of the learners performed below the desired standard?

0% 1-10% 11-50% 51-80% 81-100%

17. How frequently did learners questions indicate that they did not know what standard would be used to enforce their behavior in the test?

Never Seldom Often Frequently Constantly

18. How frequently did the learners questions/answers indicate that they did not have the necessary requisite skills and knowledges to begin the learning of new behavior?

Never Seldom Often Frequently Constantly

19. How frequently did the learner's questions/comments indicate that he could not regroup his entry level skills to perform in the newly required behavior?

Never Seldom Often Frequently Constantly

20. How frequently did the learner's questions/comments indicate that he could not transfer entry level, or newly acquired skills to the performance of required behaviors?

Never Seldom Often Frequently Constantly

21. What percent of the students failed to complete the requirements of the learning event in the time allotted?

0% 1-10% 11-50% 51-80% 81-100%

22. How frequently did student questions/comments indicate that he did not recognize the relationship between learning events?

Never Seldom Often Frequently Constantly

23. What percent of the students conpleted the requirements of the learning event with too much time left over?

0% 1-10% 11-50% 51-80% 81-100%

24. How frequently did student questions/comments indicate dissatisfaction with the learning event?

Never Seldom Often Frequently Constantly

25. How frequently did student questions/comments indicate a lack of recognition of how the learning event related to job performance requirements?

Never Seldom Often Frequently Constantly

26. How frequently did student questions/comments indicate that they were not ready to develop a new behavior?

Never Seldom Often Frequently Constantly

27. How frequently did student progress indicate that they did not possess the required entry level behaviors?

Never Seldom Often Frequently Constantly

28. How frequently did student questions/comments indicate that the delivery system being employed did not make provision for individual RATES of learning?

Never Seldom Often Frequently Constantly

29. How frequently did student questions/comments indicate that the delivery system being employed did not make provision for the entry level differences of the learners?

Never Seldom Often Frequently Constantly

30. How frequently did student questions/comments indicate that the delivery system being employed did not make provision for the differences in the learner's quality of learning?

Never Seldom Often Frequently Constantly

31. How frequently did student questions/comments indicate that the delivery systen being employed did not make provision for the learner differences in the quantity they could learn?

Never Seldom Often Frequently Constantly

32. How frequently did student questions/comments indicate that the delivery system being employed did not make provision for the learner differences in being able to deal with the intensity of the learning experience?

Never Seldom Often Frequently Constantly

33. What percent of the learners were deterred from fulfilling the learning objective because of the complexity of the delivery system?

Never Seldom Often Frequently Constantly

34. How frequently did student questions/comments indicate that they did not understand the relationship between the delivery system being employed and the job performance requirement being developed?

Never Seldom Often Frequently Constantly

35. How frequently did student questions/comments indicate that the learner is not receiving the necessary relearning from the delivery system?

Never Seldom Often Frequently Constantly

36. How frequently did students questions/comments indicate that they found the learning materials difficult to use?

Never Seldom Often Frequently Constantly

37. How frequently did students questions/comments indicate that the learning materials were hindering instead of helping learning?

Never Seldom Often Frequently Constantly

38. How frequently did students questions/comments indicate that the learning materials failed to provide for the learner differences in Rate of Learning?

Never Seldom Often Frequently Constantly

39. How frequently did students' questions/comments indicate that the learning materials failed to provide for the learner's differences in level of learning?

Never Seldom Often Frequently Constantly

40. How frequently did student questions/comments indicate that the learning materials failed to provide for the differences in the learners' quality of learning?

Never Seldom Often Frequently Constantly

41. How frequently did student questions/comments indicate that the learning materials failed to provide for the differences in the learner's quantity of learning?

Never Seldom Often Frequently Constantly

42. How frequently did student questions/comments indicate that the learning materials failed to provide for the differences in the learner's ability to cope with the intensity of the learning experience?

Never Seldom Often Frequently Constantly

43. How frequently did student questions/comments indicate that they could not identify the learning material with the job performance requirement being developed?

Never Seldom Often Frequently Constantly

44. What percent of the time were the learners inactive or passive participants in the learning situation?

0% 1-10% 11-50% 51-80% 81-100%

45. How frequently did student questions/comments indicate that their behavior had not been changed to match the specifications of the job performance requirements?

Never Seldom Often Frequently Constantly

46. How frequently did student questions/comments indicate that they had not received sufficient relearning.

Never Seldom Often Frequently Constantly

INSTRUCTORS

1. How frequently did the instructor make attempts to insure that the learner knew what the objective (behavior being developed) was?

Never Seldom Often Frequently Constantly

2. How frequently did the instructor demonstrate the job performance requirement that was to be developed by the learner?

Never Seldom Often Frequently Constantly

3. How frequently did the instructor describe the tools, assistance, materials, references, etc., that the learner would receive to perform the desired behavior?

Never Seldom Often Frequently Constantly

4. How frequently did the instructor demonstrate the use of the tools, materials, references, etc., that the learner would receive to perform the desired behavior?

Never Seldom Often Frequently Constantly

5. How frequently did the instructor describe the standard, to the learner, that would be used to enforce his behavior?

Never Seldom Often Frequently Constantly

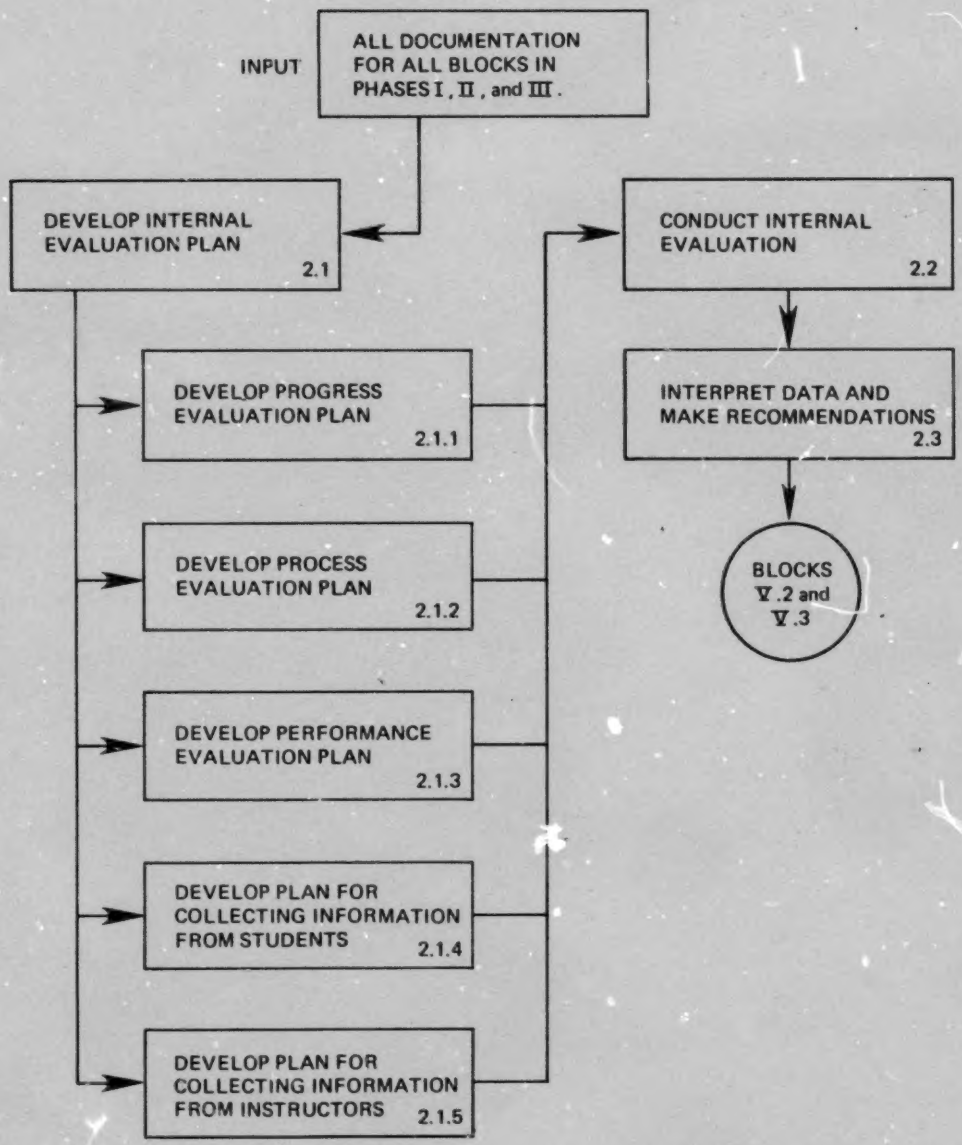
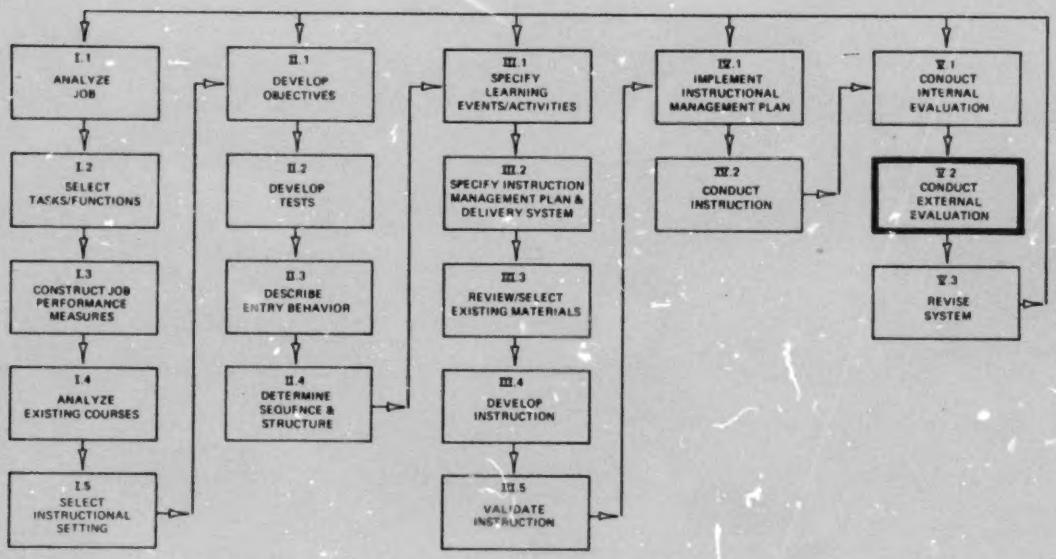

INPUT
ALL DOCUMENTATION FOR ALL BLOCKS IN PHASES I, II, and III.
DEVELOP INTERNAL EVALUATION PLAN 2.1
DEVELOP PROGRESS EVALUATION PLAN 2.1.1
DEVELOP PROCESS EVALUATION PLAN 2.1.2
DEVELOP PERFORMANCE EVALUATION PLAN 2.1.3
DEVELOP PLAN FOR COLLECTING INFORMATION FROM STUDENTS 2.1.4
DEVELOP PLAN FOR COLLECTING INFORMATION FROM INSTRUCTORS 2.1.5
CONDUCT INTERNAL EVALUATION 2.2
INTERPRET DATA AND MAKE RECOMMENDATIONS 2.3
BLOCKS V.2 and V.3

FIGURE V.1: Flowchart of Block V.1, CONDUCT INTERNAL EVALUATION

BLOCK V.2: CONDUCT EXTERNAL EVALUATION



OVERVIEW

After the internal evaluation has been completed, one major question about the training program remains unanswered. This is whether students who have completed the program and have been placed on the job, can do the job for which they were trained. External evaluation is accomplished to answer that question and, if the answer is "no," to find out why.

CONDUCT EXTERNAL EVALUATION

I.0 INTRODUCTION

The primary purpose for conducting external evaluation is to find out whether students who successfully complete training can do, to the established standards, the job for which they were trained. A second purpose of external evaluation is to insure that the job is still the same as when it was job analyzed. In a sense this revalidates the original task list.

External evaluation is different from internal evaluation in two major ways. First, while internal evaluation is conducted before and during the actual instruction, external evaluation is conducted after the students have completed the instruction and have been assigned to the job. Second, internal evaluation is concerned with whether the learning objectives developed in Block II.1 are mastered by the students. Whether the learning objectives are mastered is determined by student performance on the tests developed in Block II.2. But this does not ensure that Block I.1 through Block I.5, the analysis phase of the ISD Model, were properly carried out. Neither does it ensure that the job requirements are still basically the same as when the program development was begun. Block V.1 detailed other important interests in internal evaluation and showed how it relates to external evaluation.

The results of a properly planned and carried out external evaluation will result in either:

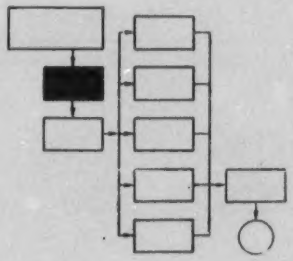
1. Assurance that students who complete the course will be able to do the job to the level of their training, or
2. Data that indicate that students are not able to do the

job to the planned standard, and on which of the job tasks they are failing.

The steps in planning and carrying out external evaluation are shown ih Figure V.10, the fold-out page at the end of this block.

2.0 PROCEDURES

2.1 Plan Evaluation



Before beginning the external evaluation, some important decisions must be made as to how the evaluation will be conducted. The following determinations must be made:

1. Who will provide data
2. What data are required
3. When external evaluation will take place
4. How the data will be gathered

2.1.1 Determine Who Will Provide Data

In planning the external evaluation, one of the first concerns is the question of who will provide data. In general, data will come from five sources:

1. Baseline data gathered before development of instruction was started (See Block II.2.)
2. Graduates being evaluated. These are graduates who are now working on the job for which the instruction provided training
3. Supervisors of the graduates listed above

4. An evaluation team, usually made up of command and school personnel
5. Records of students' performance during the instruction

In addition to the above, check out some of the graduates who are now assigned to other jobs. Why were they assigned to other jobs? Were they first assigned to the job for which they were trained, and then reassigned to a different job because they could not do the first one?

2.1.2 Determine What Data are Required

By making comparisons between the baseline data and data gathered from the other four sources, you will be able to obtain at least partial answers to questions like the following:

1. Do a greater percentage of graduates of the current instruction show satisfactory performance on the JPMs than graduates of older courses or training methods?
2. Do graduates of the current instruction require less on-the-job training than graduates of other courses or training methods?

From the graduates who are now working on the job, get answers to such questions as:

1. How well are you able to perform the job?
2. How much and what kind of training have you received since you arrived on the job?
3. How well did the instruction prepare you for the job?
4. What portions of the instruction were relevant to your job?
5. What portions of the instruction were irrelevant to your job?

6. In your job, how often do you use the skills taught?
7. In your job, what tasks have given you the most difficulty?
8. In your job, for which tasks do you feel the least adequately prepared?
9. In your job, which tasks do you think you perform the best?
10. What parts of the instruction do you think could be changed to better prepare students for the job?

From the supervisors of graduates who are now working on the job, get answers to such questions as:

1. How well are the graduates able to perform on the job?
2. How do these graduates compare to those who received no training or were trained by an alternate method?
3. How much and what kind of training have the graduates received since arriving on the job?
4. In what areas were the graduates the most adequately prepared?
5. In what areas were the graduates inadequately prepared?
6. What suggestions would you make for improving the training program?
7. Has the graduate had accidents or been reprimanded for misuse or improper operation of equipment?
8. Has the graduate been warned or commended for unusually good or bad performances?
9. Has the graduate been recommended for promotion?

From the evaluation team, get answers to such questions as:

1. How well did graduates score on the job performance measures?
2. Which JPMs did they fail?

3. What is the relationship between the JPMs and the actual job requirements?
4. Were performance tests properly administered and scored?
5. Does the command perform the job in accordance with regulations or approved doctrine?
6. How well does the supervisor know the job?
7. What other factors should be considered in making revision decisions?

2.1.3 Determine When External Evaluation Will Take Place

You generally will not want to contact a graduate or the graduate's supervisor until the graduate has been on the job for at least 30 days. This is because it probably will take that long for the graduate to get some feel of how well the instruction prepared him for the job, and exactly what the real job is all about. Also, it probably would take that long for the supervisor to get a clear picture of how well the new graduate can perform.

Do not wait more than three months before contacting the graduate and his supervisor. After that period, the graduate will be hard pressed to remember details of the instruction. He likely will have a difficult time making realistic judgments about how well it prepared him for the job. Also, the supervisor likely will have difficulty in recalling intervening training and the graduate's initial capabilities.

2.1.4 Determine How the Data Will Be Gathered

The primary methods of collecting external evaluation data are:

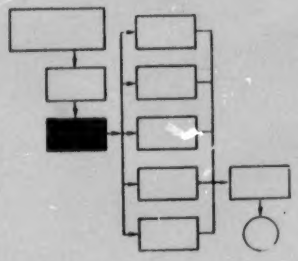
1. Job Performance Measures

2. Questionnaires

3. Personal Interviews

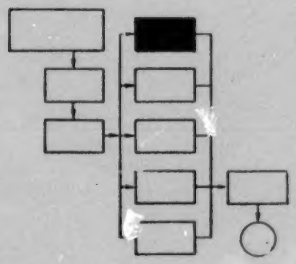
In general, you will send questionnaires to as many graduates and their supervisors as possible, and conduct personal interviews with a random sample of graduates and their supervisors in the field. The job performance evaluation approach generally is conducted by a team of subject matter/evaluation experts who gather data from actual observation of the graduate on the job, and from job performance measures. Application of these data collection methods will be discussed in greater detail later in this block.

2.2 Collect Data



The actual collection of external evaluation data is a relatively straightforward group of procedures once a detailed plan has been prepared. These procedures are:

1. Collect baseline data
2. Collect job performance evaluation data
3. Collect questionnaire data
4. Collect personal interview data
5. Obtain records of students' performance during instruction



2.2.1 Collect Baseline Data

In Block II.2, it was suggested that you gather baseline data with the JPMs in order to confirm the conclusions that the tasks selected for training were not generally being adequately performed by job incumbents. The details of how to conduct such a study were left to be discussed in this block.

A baseline study is simply a study of what currently exists. It can be used both to confirm the need for the development of new instruction, and once the instruction is developed, to provide data for the external evaluation of the new instruction. In order to give meaningful results for the first purpose, a baseline study must satisfy two basic requirements:

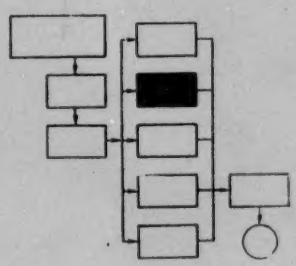
1. The JPMs (or other data gathering devices) must yield reliable and valid information, and
2. The persons to whom the JPMs are administered must be representative of all the persons (population) to whom the results will apply.

In addition to these requirements, the group on whom data is gathered must not be substantially different from the group on whom the external evaluation data will be gathered if the data are to be used for the second purpose. If the procedures outlined in Block I.3 have been followed, it is likely that the JPMs developed will be satisfactory for the baseline study. Selecting a sample that is truly representative

of the population is somewhat more difficult. The procedure outlined in Section 2.11 of Block I.1 will lead to the selection of a representative sample but also will probably result in samples that are unnecessarily large for baseline purposes. If you are willing to take a small risk that the results will be erroneous, good results can usually be obtained with samples of 100 to 400 persons. Exactly how many will be needed for any particular study depends on the amount of accuracy required, the proportion of adequate JPM performers in the population of interest, and the size of that population. You probably will need to seek assistance from experienced persons in survey design to help determine the sample sizes and sampling procedures.

In addition to determining whether the sample can satisfactorily perform the JPMs, also obtain from them background data similar to that required in Section 2.4 of Block I.1. The procedures to be followed in gathering data from the sample are given in the next three sections.

2.2.2 Collect Job Performance Evaluation Data



This evaluation is generally done jointly by school and command personnel. It is the most direct approach to getting a specific answer to the specific question of whether or not the graduate can perform the tasks.

If job performance evaluation is a normal and regular part of the personnel promotion system within your service, these performance measures will have been given according to

the regulations in effect at the time. Job performance measures that are a part of the regular promotion system will not normally be as complete as required to evaluate school performance; therefore, additional performance measures may need to be given. This will all depend on the job, the regulations, and the availability of performance measures.

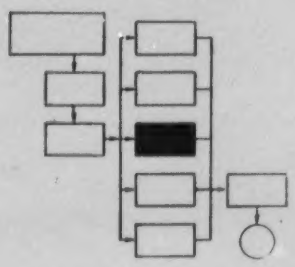
In Block I.3 of the ISD Model, it was stated that there must be some kind of a JPM developed for each of the tasks selected for training. If this was followed, there will be valid JPMs to use in the field setting. If this was not followed, external evaluation can never be more accurate than the interview and impressionistic data which is gathered in that manner. That is, there will be no hard data, no direct measure, of the performance of graduates. Decisions based on this latter kind of data are far riskier than decisions made on the basis of validated JPMs.

Where constraints of time, equipment and facility availability, cost, and safety considerations are not critical, job performance evaluation consists of actual observation of the graduate while he does his job. However, since in many cases serious constraints will exist, JPMs developed in Block I.3 will have to be evaluated rather than the actual job. For example, suppose a graduate has been trained to splint a fractured leg. The job performance evaluation team wishes to know how well he can perform this task in the job setting. It is highly unlikely that someone will be so cooperative as to wait until needed to break his leg so that the graduate can be observed while he splints the leg. Actually, one would have to watch for a long time to observe graduates performing this particular task under real-world conditions.

This was one of the reasons for developing JPMs. For external evaluation, where constraints make it impractical to evaluate the actual performance of all tasks for which the graduates were trained, the evaluation can then be based on the JPM.

The above points out one serious potential problem. If scores on the JPM accurately predict success in carrying out the actual job tasks in a real-world setting, there is no probelm. This job performance evaluation is an excellent opportunity to review the relationship between JPMs and actual job requirements. From this review can come recommendations for revision of any JPMs that do not predict successful job performance.

2.2.3 Collect Questionnaire Data



Mailed questionnaires are the least expensive procedure for collecting data from graduates and their supervisors. However, questionnaires are not the most reliable method. The validity of mailed questionnaires tends to reflect how well they are prepared and distributed and what portion of the population returned them. Also the degree of detail and the ability to follow up on unclear or incomplete responses is not as great as with the personal interview approach.

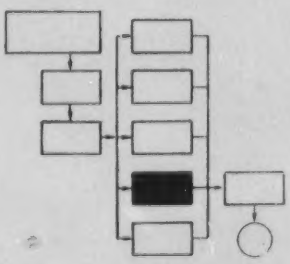
In general, more specific questions are asked when information is gathered with a questionnaire. This is partly because the process of consolidating and using large quantities of subjective data would be a formidable task. Also, more specific questions are less likely to be

misinterpreted by those who are asked to provide the information. This is important because the interviewer will not be there to clarify problems.

The main body of the questionnaire should list the tasks that the graduate was trained to perform. The supervisor may be asked to note the graduate's ability to perform these tasks. Also the graduate might be asked to note his ability to perform the tasks and to rate how well the instruction equipped him to perform each task. Such information as frequency of task performance and amount of supervision required might be included in the questionnaire. Open ended questions could be included, asking for suggestions on how to improve the instruction, or about the equipment, materials, or procedures used by the graduate.

Valid results from mailed questionnaires depend largely on the behavior of respondents. A total sampling is desirable. Variations in job requirements occur because of command requirements, geographic locations, organizational level, etc. Therefore, make certain to include all graduates. Since not all students and supervisors will return the questionnaires, a large number is essential.

2.2.4 Collect Personal Interview Data



Ideally, personal interviews are conducted by specialists from the quality control team who are familiar with the particular job for which the graduate was trained. They visit a representative sampling of graduates and obtain first hand data on graduate assignment,

utilization, and work proficiency. Data is gathered through separate interviews with the graduate and his supervisor. In addition, telephone interviews may be used.

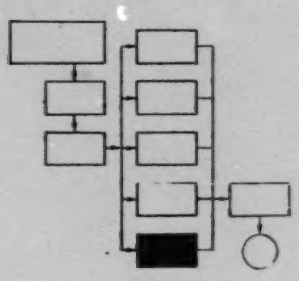
Make a special effort to clarify to both the graduate and his supervisor why the interviews are being conducted and what will be done with the collected data. If they realize the important part they play in the evaluation process, they are more likely to give the kind of information needed.

Section 2.1 of this block lists the general types of information needed from the student. Use preplanned lists of questions and try to get honest, pertinent answers. The Collect Data section of Block I.1 gives suggestions on interview procedures.

For an interviewer, the main task is to determine graduate proficiency. But, he must also be concerned with how the graduate's skills are being utilized, and how well the graduate is progressing through additional training. To gather these data, prepare a list of supplementary questions. Use this list as a guide when interviewing the graduate and his supervisor. Of course, feel free to alter the planned sequence, rephrase questions, and add or delete questions. Generally fit the conduct of the interview to the responses obtained from the person being interviewed. Accurately record answers to significant questions.

In addition to the above, you may wish to administer the same questionnaires developed for Section 2.2.3, assuming, of course, that the individuals being interviewed will not be included in the group who will receive the questionnaire as part of the questionnaire survey.

2.2.5 Obtain Records of Students' Performance During Instruction



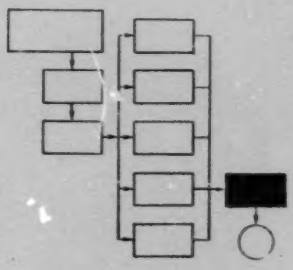
The internal evaluation resulted in verification of cut-off scores for the lesson posttests and the JPM. In the regular operation of the instruction, students are required to repeat lessons if they fail the posttests or the JPM. Records of students' progress through the instruction should be available to the external evaluator in case the other evaluation data indicate that students are not performing well on the job.

Figure V.11 shows an example of a data sheet that gives course data for each student participating in the external evaluation. A posttest was used after every lesson and each student's results for each lesson is shown. At the top of the lesson column, the passing criteria is listed. Some tests give numerical scores and a pass criterion while others only have two possible scores--pass or fail. Student 027 scored 17 on his fourth try at the test for lesson one, module A, Unit VII. He needed 17 out of 25 and finally got that score. Here the 17 was his score and the tally marks show the number of times plus 1 he took the test.

CRITERION / STUDENT #	UNIT VII					UNIT VIII					
	MODULE A			MODULE B		MODULE A					MODULE B
	LESSON			LESSON		LESSON					LESSON
	1	2	3	1	2	1	2	3	4	5	1
	17/25	P	5/6	P	P	15/20	P	2/3	3/3	4/4	P
027	17	P	5	P	P	15	P	3	3	4	P
139	20	P	5	P	P	16	P	3	3	4	P
590	17	P	5	P	P	15	P	3	3	4	P
445	22	P	6	P	P	15	P	3	3	4	P
229	23	P	6	P	P	20	P	3	3	4	P
611	18	P	5	P	P	16	P	3	3	4	P
124	24	P	6	P	P	20	P	3	3	4	P
415	18	P	6	P	P	16	P	3	3	3	P
187	23	P	6	P	P	19	P	3	3	4	P
327	22	P	5	P	P	20	P	3	3	4	P
576	18	P	5	P	P	16	P	3	3	4	P
404	20	P	5	P	P	15	P	3	3	4	P
↓ Complete list of class, company, group, etc.											
TOTAL 12											
TEST 1	5	0	10	0	12	8	0	12	12	12	6
2	4	12	2	6	--	3	2	--	--	0	3
3	3	--	--	4	--	1	5	--	--	0	3
4	--	--	--	2	--	0	5	--	--	0	0
TOTAL	12	12	12	12	12	12	12	12	12	12	12

FIGURE V.11: Student Performance Data Sheet

2.3 Consolidate Data and Make Recommendations



The primary product of this block is an external evaluation report (EXER). This report is a summary statement, referring all pertinent information resulting from the procedures followed in this block, of the external evaluation findings, their interpretation, and specific recommendations for revision of the instruction or the instructional system. A summary statement of the previous sections of this block should be included in this report. The procedures for consolidating data and making revision recommendations follow.

How to consolidate data into a usable format has been covered in Block I.1. Compile separately the questionnaire inputs from graduates, questionnaire inputs from supervisors, personal interview inputs from graduates and from supervisors, and JPMs. Once the data has been reduced to these easier-to-handle blocks of information, begin evaluating the data by asking some pertinent questions, and checking the data for answers.

Probably the first question to ask is:

1. Can the graduate perform, on the job, the tasks he was trained to perform, at the planned level of proficiency? Most likely there will be some conflicting data. For example, most graduates may say they can perform the tasks while most supervisors may say they cannot.

This leads to other questions:

2. Precisely which tasks are not being performed satisfactorily? Look for the answer to that in the data pool.
3. What does the job performance evaluation data say about these tasks that the supervisors claim are being inadequately performed? If the JPMs were given and the evaluation was positive, there is evidence that either the JPM or the work procedures in this command are inadequate.

Some additional questions to ask are:

4. Are the tasks that the supervisors think the graduates should be able to perform, the same tasks that were listed in the original job analysis? If there are discrepancies, why do they exist?
5. Are there tasks for which the supervisors think graduates were inadequately trained that were on the original task list but were not selected for training?
6. Are there areas where there is general agreement that while graduates can score well on JPMs, they cannot do the actual task?

The above should illustrate the point that there are no hard, fast rules for evaluating the data and making recommendations for change. If most graduates and most supervisors are satisfied with the quality of training, recommend that few if any program changes be made. At the other extreme, if a representative sample of graduates and supervisors feel something went wrong between the initial job analysis and the final training program, the program is inadequate; sift through the data to find possible causes for the inadequacy.

If many graduates cannot perform the tasks they were trained to perform, study the training data in relation to the other data gathered in the external evaluation. You may, for example, want to construct a table of the kind demonstrated in Block V.1 to see whether performance data on the JPM administered at the end of the course can be used to identify graduates who cannot perform later on. This would be especially important if the two JPMs were not of identical form. You might find that students who had to take the end of course JPM three or more times before passing it are most likely to fail the JPM administered by the external evaluators, while students who took it only once or twice rarely fail the current JPM. In such an instance you might need to re-examine the course prerequisites and entry behaviors.

Similar tables might be constructed to show relationships between supervisor ratings and some or all of the data shown in Figure V.11. The test summary data at the bottom of Figure V.11 are particularly useful in determining required changes in the instruction. At the bottom of each column is recorded the number of times each test was given and the number of students who passed each time. Look at module A, lesson 2 in Unit VII. Notice that no one passed the first time and everyone passed the second time. Results like that are suspect. Probably there is either a trick to passing the test which should be included in the lesson, or the tester is not scoring the same each time.

In lesson 2 in module B, Unit VII, everyone passed on the first trial. Perhaps the test was a give-away, too easy, or there was too

much instruction on such an easy unit. The opposite is true in lesson 2 of module A, Unit VIII, no one passed in one or two trials. The students may pass by memorizing the test rather than by learning what the lesson is designed to teach.

How bad does a program have to be to cause recommending revision? That is a very difficult question to answer. Fortunately, in the ISD procedures, if you can pinpoint the problem area in ISD developed instruction, it generally can be fixed without disrupting the entire program. Probably the best single guideline is to recommend program changes in areas where there is reasonably high graduate/supervisor agreement that a change is needed, provided the job is done according to regulation. Then, in areas of disagreement, use the job performance analysis data to determine if the problem is internal or external to the ISD developed course.

As a result of the above evaluation, one or more of the following types of recommendations for change may be made:

1. Change the instructional system.
    a. Correct task selection discrepancies by revalidating task lists.
    b. Correct task selection errors by reevaluating selection criteria.
    c. Improve JPM validity.
    d. Revise instruction to fit changes made in the analysis phase.
2. Change the job structure.
    a. Enforce documentation; that is, if an individual is

assigned to a certain job, make certain the job he is actually given to do, matches the job description.

b. Provide necessary support such as tools, equipment, etc., needed to perform the job.

If external evaluation shows problems with the instructional program, go to Block V.3: REVISE SYSTEM, and make the necessary changes. After making these changes, conduct internal and external evaluation again. Eventually, major errors will be eliminated and changes made will be only normal program revision based on changes in content and doctrine.

At this point study the effectiveness of the program by answering the questions asked in Section 2.1.2.

1. Do a greater percentage of graduates of the current instruction show satisfactory performance on the JPM than graduates of older courses or training methods? and
2. Do graduates of the current course require less on-the-job training than graduates of other courses or training methods?

In answering the first question, select a group of subjects from the baseline study who are similar to the graduates of the instruction being evaluated in education, length of time elapsed since training, military experience, etc. Then simply compare the percentages of persons in the two groups who perform satisfactorily on the JPMs. If the level of satisfactory performance in the baseline group is low and the graduates being evaluated perform well (for example, 40 percent success in the baseline group and 85 percent success for the graduates

of the instruction being evaluated), you probably do not need to make statistical tests. If, however, the baseline group performed well so that the differences were small (for example, 75 verses 85 percent) you will want to make a statistical test to determine how often such a difference could be due to chance alone. You should obtain help from a research and evaluation consultant in making these tests. The answer to the second question can be obtained in the same way but the data will come from the questionnaires and interviews of the personnel and supervisors involved.

Does the ISD process stop here? No, it never stops. The fact that today's graduates can do the job they were trained to do does not mean tomorrow's graduates will do the same. The job may change, students may change, something in the course may change; the qualities of instructors may change. Assuring optimum training quality at minimum cost demands a constant feedback of information, and periodic evaluation of the relationships between students, the instructional program, and job performance in the field.

3.0 OUTPUTS

The outputs of this block should consist of:

3.1 Products

An external evaluation report (EXER). This report is a summary statement of the external evaluation procedures, findings, interpretation, and revision recommendations.

3.2 Other Documentation

Supporting information including:

1. A statement of pertinent information about the graduates included in the evaluation. This statement should include:
   a. Number of graduates evaluated
   b. Graduates pretraining experience, education and other pertinent personal information
   c. When graduates began and completed the particular course being evaluated
   d. Statement of graduate's work activities at time of evaluation
   e. Statement of reasons why any graduates are not assigned to the duty for which they were trained
2. When external evaluation took place. How much time had intervened between completion of training and conducting of external evaluation
3. Statement of how the evaluation was conducted. This statement should include:
   a. Number and qualifications of evaluators
   b. Statement of how data was collected
   c. Pertinent details on how job performance evaluation was conducted
4. A statement of graduate's responses to mailed questionnaires and personal interviews
5. A statement of supervisor's responses to mailed questionnaires and personal interviews

6. A statement of results of job performance evaluation
7. How data from items 4, 5, and 6 above were interpreted
8. Any pertinent information not listed above, that influenced final recommendations
9. Recommendations for change in instructional system
10. Recommendations for change in job structure
11. Any other recommendations

EXAMPLE

Sample summary of External Evaluation Report for a course in OH-58 Helicopter Repair. The External Evaluation Report, like the Internal Evaluation Report in Block V.1 is too extensive for this abbreviated example. Many conclusions can be drawn, however from the coded data spread sheet in Block V.i (page 36).

Conclusions:

1. Thirty percent of the sample of students had previous work experience in the area. These students performed very well on the entry test, within-course tests, and performance test. They also tended to receive very high ratings from both supervisors and peers.
2. Only 10% of the student sample indicated personal interest in the area. Student performance was not enhanced, however, and tended to be on the low side of average.
3. Number of promotions had no relationship to school or job performance.
4. Students who performed moderately well on the entry test tended to perform moderately well on the performance test and receive high ratings from both supervisors and peers.
5. Safety records reflected no relationship to performance in school.
6. Supervisor ratings relate very strongly with peer ratings.
7. All trainees were assigned to the appropriate DOS.

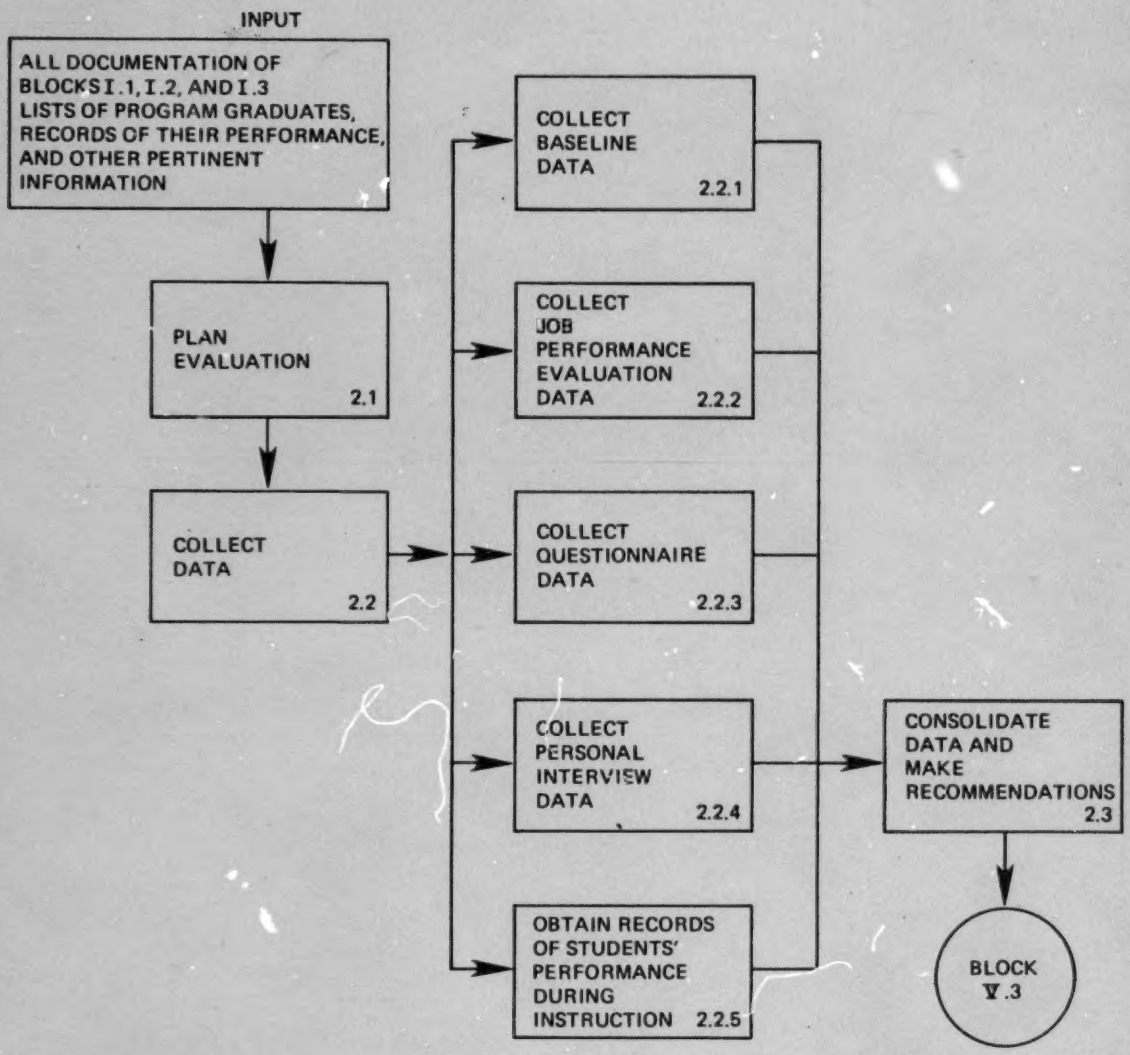
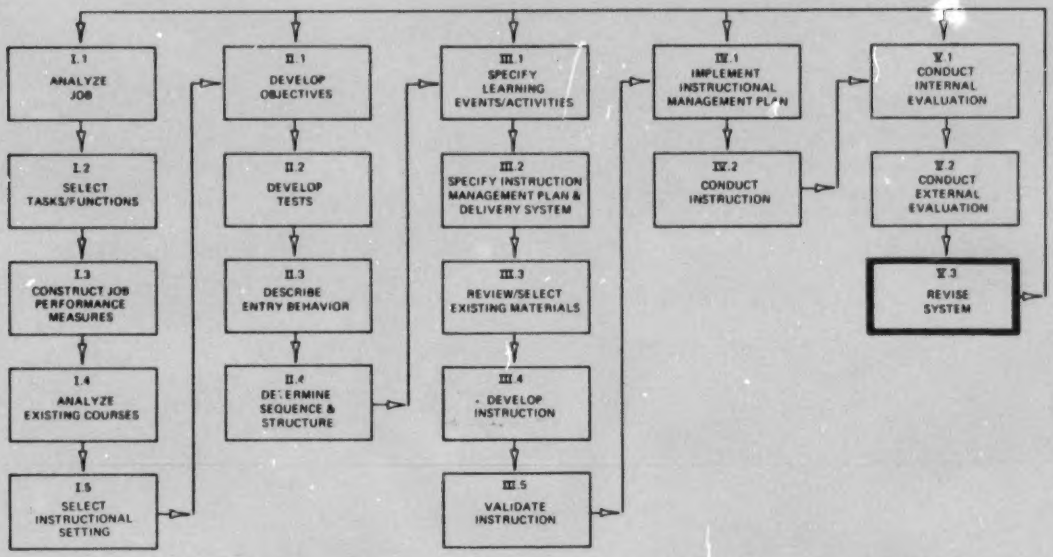

INPUT
ALL DOCUMENTATION OF BLOCKS I.1, I.2, AND I.3 LISTS OF PROGRAM GRADUATES, RECORDS OF THEIR PERFORMANCE, AND OTHER PERTINENT INFORMATION
PLAN EVALUATION 2.1
COLLECT DATA 2.2
COLLECT BASELINE DATA 2.2.1
COLLECT JOB PERFORMANCE EVALUATION DATA 2.2.2
COLLECT QUESTIONNAIRE DATA 2.2.3
COLLECT PERSONAL INTERVIEW DATA 2.2.4
OBTAIN RECORDS OF STUDENTS' PERFORMANCE DURING INSTRUCTION 2.2.5
CONSOLIDATE DATA AND MAKE RECOMMENDATIONS 2.3
BLOCK V.3

FIGURE V.10: Flowchart of Block V.2: CONDUCT EXTERNAL EVALUATION

BLOCK V.3: REVISE SYSTEM



OVERVIEW

System revision may be required because of changes in doctrine or content, deficiencies in instruction revealed by internal evaluation or external evaluation, or requirements for making the instruction more efficient in terms of time, money, or other resources. The revision process requires empirical data for determining specific areas of revision that will produce optimum pay-off in terms of increased efficiency or reduced time or costs. The revision may consist of relatively minor changes to specific parts of the system or may involve major revisions of the instruction and procedures.

REVISE SYSTEM

1.0 INTRODUCTION

The final function in the ISD process is that of maintaining quality control of the instructional system through the process of revision. Revision here means any systematically planned change in the ISD process based on operating experience and data such as that collected and analyzed in Blocks V.1 and V.2, that are subject to verification through continued evaluation. Generally, revision means those changes made in the procedures, techniques, and materials in the system. The emphasis is on change of technique rather than of content, doctrine, or curriculum.

In this block, decisions are made based on the inputs from Blocks V.1 and V.2, and the comparisions of these reports with the plans of the entire system. The revision process is characterized by analysis, interpretation, planning and follow-up. The inputs are analyzed and interpreted, those elements of the system found deficient provide the basis for a revision plan that is to be executed according to an established schedule. The follow-up is to see that the planned changes are made in accordance with the plan.

Since a considerable amount of work and effort has gone into the design and development of an instructional program, it is fair to ask, "Why revise?" That is the most frequent question that must be asked in this part of the process. Unless it is necessary to revise, it is necessary not to revise. To revise for the sake of revision is not good planning. The decision about what to revise, if at all, should be made after careful analysis of the recommendations submitted in the Block V.1 and Block V.2 evaluation reports.

As with most other features in a systems model, the reason for revision usually is that a clear discrepancy has been identified. It is ordinarily the size of this discrepancy that causes people to undertake revisions. There are many discrepancies that can occur in any of three major areas:

1. Needs
2. Internal Results
3. External Results

Evaluation could reveal a clear discrepancy between internal needs and the instructional program results. Or, there could be a discrepancy between the external needs and the external results. Isolating the problem cannot be done without both internal and external evaluation data. Internal evaluation could show that the instruction was meeting the planned expectations; the trainees could do what they were taught to do. But, the results could be judged inadequate by external evaluation: the graduates could not do the job to which they were assigned. It is possible that some instruction will result in overtraining, but discovering over-training is very difficult.

When results of training are thought to be inadequate, the evaluation process must be designed to locate and evaluate possible causes. Well-trained personnel may be sent to duty assignments and through improper assignment or inadequate supervision not perform well on the job. It may be that there is a delay of several months between completion of training and the assignment to training-related activities in the duty assignment. All of these have happened, and many times the resulting inadequate job performance has erroneously been thought to be the fault of the training.

Although there are no absolute rules of assigning a particular cause to a particular discrepancy, the relationship of the training to the actual job assignment, the length of time since training, the availability of supervision, and job conditions upon which training assumptions were made should certainly be taken into consideration. As with most other changes in the instructional program, most of the revision requirements will be generated through normal changes in equipment, tactics, operational procedures, restructuring of Defense Occupation Specialties, and other specific factors relating to doctrine and operations. Changes brought about by normal operations can be more easily scheduled and can become a part of normal operating procedure for the various departments responsible for the instruction.

There are three major sources of inputs to this block:

1. The Internal Evaluation Report (INER) from Block V.1
2. The External Evaluation Report (EXER) from Block V.2
3. The System Master Plan either from Phase III, or as specially summarized, from Block V.1.

Internal evaluation reports consist of specific and detailed data, and recommendations for revisions based on evaluations of these data. The INER is concerned primarily with the quality and achievements of the separate components: The instruction, the tests, the degree to which the instruction adheres to the Model, the learning objectives, and a number of other related factors.

The EXER deals principally with the relative success of the graduates as they perform on the job. The report presumes a careful follow-up of the graduates in actual work assignments, including the administration

of JPMs, questionnaires, interviews, and responses from supervisors and others who are informed about the graduate's performance. It further serves as a check device to insure that the same requirements exist in the field as existed when the instruction was designed. This report which is an output of Block V.2, contains the external evaluative findings along with specific identification of problems and recommendations for revisions. These recommendations are based on an analysis of field user needs rather than on judgements about the effectiveness of the instruction.

The system master plan includes the requirements and specifications; exactly what is needed and expected from the instruction to meet the needs of the using commands. The existence of this control document is an essential requirement of the revision process. It is the base-line that indicates what the instruction was planned to achieve. The importance of this plan cannot be overemphasized. If the plan is not documented and not a part of the evaluation, it will be difficult to ever establish factually what it was the instruction started out to do. This action is important because instruction could operate for years and the original designers and developers be gone before significant decisions are made based on external evaluation data. It is important to know what was originally planned, rather than just what is needed now. Having such information will make it easier to understand the decisions that were made early in the program development.

The process of making revision decisions involves the analysis of the data and recommendations from the INER and EXER. Following this analysis of facts and needs, revisions are planned in terms of most immediate needs consistent with available resources.

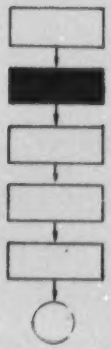
There will never be enough people to do everything that could be done to improve an instructional program. Consequently, a list of priorities must be developed on which to base the allocation of money and personnel resources to the project. Revision may mean that other needed instruction will not be developed or will not be developed on the original schedule. Such decisions cannot be made solely on the basis of the performance of the instruction, no matter how good or how bad it may be.

If there are a number of interests that must be served in making revision plans, perhaps one of the rating or ranking methods discussed in Block I.3 or Block II.2 would be appropriate. The number of people whose interest must be respected in revisions could be given the assignment of rank ordering the revision requirements. Perhaps they could agree on the criteria they would use in making these determinations. This interdepartmental decision-making may be required since many of the activities of revision will cut across many vested interests.

The output of Block V.3 is a revision requirements report which is submitted to the groups that will accomplish the work outlined in the report. Representatives of these groups, working as a team, must decide the actual work schedule and resource requirements necessary to accomplish the revisions. Further, a time schedule must be prepared that shows the needs for resources through the entire life of the revision process. A detailed outline of how to prepare the revision requirements report will be presented later in this block. The steps in revising the system are shown in the flowchart in Figure V.12, the fold-out page at the end of this block.

2.0 PROCEDURES

2.1 Determine if Revision is Required



There are a number of reasons why revision of existing instruction might be considered. The major reasons are:

1. Change in doctrine or content. The Defense Occupation Specialty (DOS) may be changed because of changes in command organization, or because of the introduction of a new weapon system, equipment, etc.
2. The Internal Evaluation Report (INER) may indicate that learning objectives are not being met.
3. The External Evaluation Report (EXER) may indicate that graduates are not able to do the job for which they supposedly were trained.
4. Evaluation of the instruction or changes in training requirements indicate a need for making the instruction more efficient in terms of time, money, or other resources.

For some of the items listed above, the decision as to whether revision is required is relatively simple; for others, the pros and cons must be carefully balanced. Following is a more detailed discussion of each item.

2.1.1 Making Decisions Based on Changes in Doctrine or Content

If a DOS is restructured for reasons such as doctrinal changes, or introduction of new procedures, facilities, weapons systems, etc., the related instruction clearly will have to be revised. If the tasks required of the restructured DOS are different, the revision process will have to begin with Block I.1, ANALYZE JOB. It will be necessary to have an adequate analysis of the revised job or procedures before developing instruction to achieve the revised objectives.

When jobs change or DOSs are restructured, tasks selected for training in any given DOS are directly affected. For example, suppose instruction had been based on information gathered in the field prior to the consolidation or restructuring of the DOS. In addition to Block I.1, ANALYZE JOB, another likely place to find discrepancies would be in Block I.2, SELECT TASKS/FUNCTIONS. It has been indicated repeatedly that those tasks rated as high priority for one DOS may be only "nice to know" in a related DOS. After the DOS restructuring, the priorities may change considerably. In this case, it would be necessary to go through the selection process again, making sure that appropriate representatives for all of the affected DOSs were included in the selected sample. Adding and deleting tasks in the restructured DOS may completely re-order the priority of all the tasks on the list. The task list should be considered as a total entity and individual tasks should not be added or deleted without careful revision of all tasks.

Since this process is a technical one, it should only be undertaken by those who are familiar with the process and preferably by those who did the original work on the DOS.

2.1.2 Making Decisions Based on the Internal Evaluation Report

If the Internal Evaluation Report (INER) points out that students are not meeting the learning objectives, some degree of revision will be essential. Either the tests are too stringent, or they are testing the wrong things, or the instruction is inadequate for the particular students entering the course. If the students who have been entering the course are representative of those who must be trained, either the tests, the instruction, or both must be revised.

It should be emphasized at the beginning that revising instruction does not mean the same thing as adding instruction. Inadequate performance in some areas of the course will require careful analysis to find the cause of the problem, and revision of the inadequate portions must be based on conclusions about the causes of the problems. While revising instruction may involve adding instruction, this is not always the case.

2.1.3 Making Decisions Based on the External Evaluation Report

IF the External Evaluation Report (EXER) shows that graduates who are promptly assigned to the duties for which they were trained are not able to perform these duties, the course must be revised. However, note that the above statement contained a big "IF." Some implications of this are:

1. If the graduate was not assigned to the duty for which he was trained until six months or more after completion of the instruction, the problem is probably with the assignment rather than with the instructional program. Perhaps training can be postponed until the individual is in line for immediate assignment to the duty.

2. If the graduate was trained for one job but assigned to a different one, the instructional program cannot be blamed for his inadequate performance.
3. If the graduate's supervisor requires the graduate to perform tasks that are not officially considered a part of the job to which the graduate is assigned, something is wrong somewhere in the command system. But it would be erroneous to assume that the instructional program was inadequate.

Only careful analysis of the EXER data will make possible a realistic decision as to whether the proper tasks have been selected for training, and whether individuals who meet the learning objectives can reasonably be expected to perform the job tasks.

2.1.4 Making Decisions Based on Efficiency of Instruction

Probably any instruction can be made more efficient; that is, if you are willing and able to pay the price. The real consideration here is whether the pay-back from increased instructional efficiency will be greater than the cost of making it more efficient.

There is a fundamental assumption in ISD in this area that has, over a wide number of cases, tended to hold up. It is not, however, specific to any given instruction and there are no specific laws or equations that can be written. However, simply stated, instruction should be revised when the time or cost to revise (investment) will be repaid by the improved time or cost performance.

Suppose that in Block III.5, it was decided that the instruction was sufficiently valid to be used. And suppose the decision was based

in part on the fact that there were alternative or repetitive instructional pathways to provide remedial or repeat instruction in those areas where students did not reach criterion on the first exposure. Once this decision has stood for a while (through a number of students) its appropriateness again can be brought up for consideration.

If the number of students who repeat segments of the instruction is fairly high, and the required amount of instructor time is high, revising the materials in order to increase the efficiency may be profitable. This assumes, of course, that the instruction was effective and that the students were meeting the criteria after second or third testings. If the students were not meeting the criteria, then it is obvious that revision efforts must be undertaken anyway.

The principle:

INSTRUCTION CAN BE MADE MORE TIME EFFICIENT THROUGH EMPIRICALLY BASED SYSTEMATIC REVISION,

is probably sound for all instruction that has not been developed and revised by ISD processes. However, each time it is improved, it moves closer to its extreme limit of improvement. For example, if instruction is improved by a factor of 50% of its original time during the first major revision, this same percentage improvement cannot continue in successive revisions. There are both procedural and arithmetic reasons for this limit.

The arithmetic reasons are simple. If instruction takes 100 hours and is reduced by 50%, it now takes 50 hours. If it is reduced by 50% again, it would take 0 hours if the original time is used as the basis for comparison. If, on the other hand, the new base of 50 hours is used, and that is reduced by 50%, the reduction is actually 25 hours.

That 25 hours is only 25% of the original base. So, on successive revisions, only smaller and smaller real reductions can be obtained. The first iteration reduction was 50 hours, the second reduction was 25 hours, and if it were done again at the same rate, the reduction would be only 12.5 hours.

The technical reasons, while not so obvious and systematic, are, nonetheless, important. The state-of-the-art is simply not able to produce the same percentage of improvement on successive revisions. There is a tendency to use up all of the good procedures for reducing time early in the revision cycle, and much more costly and difficult procedures are required to make continued improvements. Some of these procedures would have to be tested in the actual environment and might or might not work.

Propeller aircraft in the late 1930's and 1940's became faster and faster and could carry heavier payloads for longer ranges. Gradually, they reached their limit. If it is assumed that 450 mph was a realistic maximum speed, when the top speed of existing aircraft was only 250 mph, there was a strong possibility of making gains with new models. However, eventually these gains were made. It is difficult to imagine much of an improvement over an F-51 or an AD, other than special purpose modifications. They could be made safer, more reliable, gradually increasing range, payload, or speed through trade-offs, but they were about as good as they were going to get without a major breakthrough. The F-86 and the F9F were dramatic changes due to fundamental improvements in power plant technology. They were not "improved," they were drastically changed. They represented a major breakthrough.

Unfortunately, such a major breakthrough in educational technology cannot presently be offered. However, it is not necessarily true that instruction that has been made more efficient or less costly cannot be made more effective. Or, if it is effective, it can probably be made more efficient or less costly, unless it has been revised several times. These factors must be taken into account during original design as well as during the revision process. Think of the trade-offs necessary to arrive at a correct mission configuration for an aircraft: range, payload, and speed. The same principle of trade-offs applies to design and revision of instruction.

Figure V.13 is most important for the revision decision. It shows that for an equally effective instruction, the number of revisions it goes through determines the percentage of time reduction that can be attained. If the original version was a traditional course, and the first revision was ISD, the time savings probably would be greater than that shown in the figure. The major point here is that if time savings are important, they are most likely to occur after only a few revisions: after that there is little excess instruction left to reduce. If a course has reached somewhere between 50% and 70% of original time, there is little chance of further time reductions after the fourth or fifth iteration and revision.

The key here is the number of times that adequate ISD revisions have been made, not the number of students who have gone through the instruction or the number of classes graduated. This point cannot be over-emphasized. Each time substantial gains are made on the basis of revision, the chances for making as much of a gain on the next revision are less.

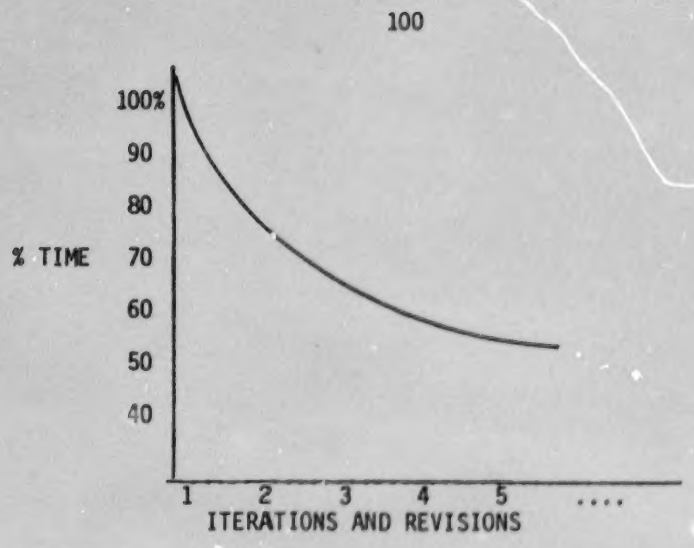


FIGURE V.13: Time Reductions in ISD Courses as a Function of the Number of Revisions. (This assumes ISD is applied to an existing course which is 100% time.)

One should conclude that revisions made early ought to be as thorough and complete as possible so as to make as much of the total possible gain as can be made. Saving 20% of 100 hours is much more desirable than saving 20% of 50 hours, since it is usually the actual number of hours saved that makes the difference, not the percentage of change from the base.

The time and effort needed to reduce the time in the course are added costs. They should have the characteristics of investment, and that investment will either prove to have been a good use of resources or not a good use of resources, depending on the results. Usually a good investment in course efficiency requires that a large number of students go through the course.

Cost per student is another dimension. Traditional forms of instruction which use a relatively constant teacher-student ratio will result in

an almost linear cost based on the number of students. Courses which have been done according to principles of ISD, in which cost was a planning constraint, should produce economies similar to those shown graphically in Figures V.14 and V.15.

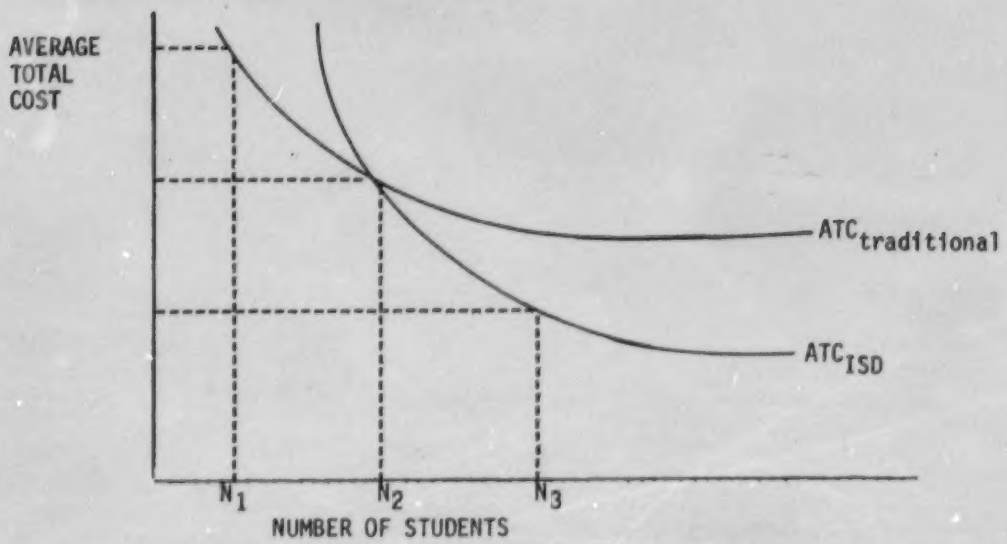


FIGURE V.14: Average Total Cost in ISD and Traditional Instruction as a Function of the Number of Students.

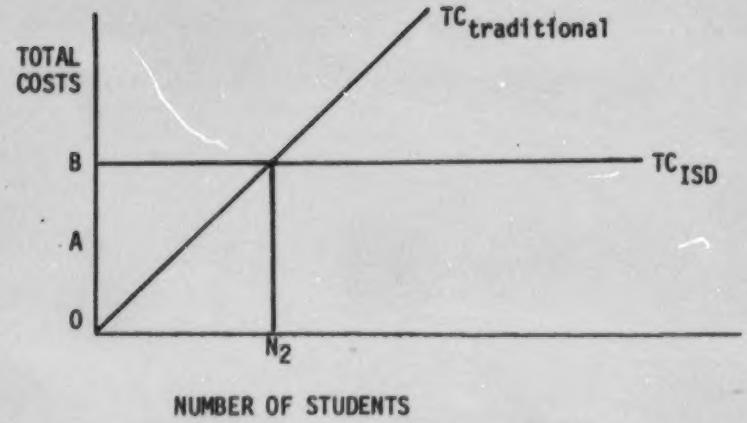


FIGURE V.15: Life Cycle Costs for Traditional and ISD as a Function of the Number of Students

Investments in educational technology may lead to reductions in the average cost per graduate in a training program. These investments can be justified if the cost reductions stemming from the adoption of new instructional methods exceed their added costs. The tools of instructional technology are usually so characteristic of the more capital intensive technologies that they usually cannot be acquired and implemented on any sort of continuum. They must be acquired in discrete units and often with capacities which far exceed those needed for training systems with small throughput. Furthermore, they are usually highly specialized and technically efficient. Scale economies, which are characterized by a reduction in the average costs for graduates, are often very significant for the larger training systems.

The analysis of average student costs is illustrated in Figure V.14. In this instance, the average total costs are equal for systems at N_2. For systems which have more students than N_2 (e.g., N_3), the ISD system is less expensive, while at N_1, it is more expensive.

The previous discussion is a static analysis and does not represent a life cycle cost estimate. A life cycle cost estimate must consider the incidence of costs and time, and discount each increment of cost to determine that system with the lowest present cost which represents the most efficient alternative. Figure V.15 demonstrates this relationship.

The total costs of a traditional system and an ISD system are illustrated by the functional relationship of $TC_{traditional}$ and TC_{ISD}. The initial investment for the traditional system (OA) is less than for the ISD system. However, the ISD system has lower variable costs and for a system with a capacity for more than N_2 students, the ISD system becomes less expensive.

2.2 Determine What Needs Revision

Certainly you should not begin revising until the cause of the problem has been carefully identified and verified. The person in charge of making revision decisions must be sure that the causes and recommendations in the INER and EXER are well-founded. It is this independent review of the findings that gives this block its unique importance. That is why the functions of instruction, evaluation, and making revision decisions have been stated and placed separately in the model. They all provide a system of checks and balances and the opportunity to be independent of each other in the eyes of management. As these independent functions are separately evaluated, each group involved should be held responsible only for its function. Instructors should not be held

accountable for bad design, evaluators should not be responsible for bad results, and revisers should be completely independent of it all to permit as much objectivity as possible.

2.2.1 General Guidelines for Deciding What to Revise

The question of "what needs revision?" is a critical one. To answer this question, a number of factors must be considered in the context of the total operation of the course. Certain blocks in the Model can be identified as being high-, medium-, and low-payoff processes. Blocks I.1 and I.2 are examples of potentially high-payoff steps in terms of dollars, time, and validity. Any revisions made in these blocks impact the entire course. Changes in the outputs of Blocks I.1 and I.2 will require the addition or deletion of segments of the course.

On the other hand, changes in the media probably will result in minimum changes in validity and time and will be reflected mostly in cost changes. Thus, changes made early in the ISD process ordinarily result in greater differences in cost, time, and effort than changes made later in the process.

This should not be interpreted to mean that you should begin at the end of the process and work toward the front! Recently, during the process of developing instructional materials, some trainees were not doing well on the posttest. The designers, exercising one of their options, simply revised the test; greatly improving the "quality of the instruction." It was cheap, quick, and had the desired outcome. But the logic was the same as adding a quart of water to a quart of milk and saying there were now two quarts of milk. There were two quarts of something, but it would be illegal to call it milk.

The most direct source of information that will be useful in deciding what to revise will be the INER and EXER. As the instructional designer gains more experience, the decisions made based on this data should get better and better. However, now, some aspects of the course are much more readily and accurately evaluated than others. Mention was made earlier that internal evaluation was more accurate than external evaluation because the test instruments are more accurate. Performance tests, time, job task data, and student achievement are all more directly evaluated than are external factors such as job performance under a wide range of field conditions. If students are having problems with a certain part of the course, the problem usually is more easily found and corrected than if supervisors are not satisfied with what students are learning in the course. This is true because student performance measures are more direct than are supervisor ratings. In supervisor ratings, much of the error can be in the supervisor.

2.2.2 Considerations in Revising Operating Instructions

As in many processes, many of the problems in deciding what to revise boil down to practical everyday issues: Time, people, and money. Once instruction is operational, it usually has to stay operational since the needs for trained people continue to exist. This means the instruction must be revised during the time it is still being offered. And, since everyone is usually fully occupied with its operation, there are few, if any, people to do revision work. On the bright side, if everything has been done in the original design to make the instruction as modular as possible, revision becomes easier since the problems can be isolated and the instruction revised one piece at a time. Further, if self-paced

instruction is used, students can often be rescheduled to give some relief and time for revisions.

It is also possible to substitute instructors for modules while the module is being revised. The opposite is rarely true. Instructors may resist being "replaced" by modular instruction or self-instruction, also it takes time to develop the modules. If the instruction uses self-pacing and peer tutoring, for example, the early finishers can be taught the revised information or procedures and then can be used to teach the new material to others while the modules are being revised.

2.2.3 Considerations in Attempting to Reduce Time

The alternatives already discussed often work well when the problem is found to be a change in doctrine or content. Other problems may require more creative solutions. Suppose the instruction were self-paced and modularized, but the problem was that it was taking too much time. Suppose, for example, the trainees were not getting to their duty stations soon enough. Shortening instruction can be accomplished by removing some of the content, but instruction developed by the ISD process should not have content that can be eliminated unless field conditions have been changed. Also, one of the design features of the ISD Model is to eliminate, where possible, subjective decisions and to emphasize data-based objective decisions. For example, assume it is highly desirable to reduce the length while keeping the original level of performance (effectiveness). To do this, we must apply the concepts of Value Engineering to the ISD process.

A basic assumption is that noting is "free." Every accomplishment requires time, money, or other resources. So, to "value engineer" ISD instruction, time and effort must be spent in finding ways to achieve the same results in less time, and, hopefully, without increasing the total costs. It is not always possible to increase efficiency without increasing costs, but those decisions must be made deliberately.

In order to revise instruction to reduce student time, it is necessary to have good data on the length of time required by the trainees to complete each current segment or module. There are rules of thumb for good places to look. One possibility is that there are bottlenecks in the system; that is, places where students must spend considerable time waiting their turn to use materials or equipment, or waiting to be tested or processed by the instructors in some way.

The time spent in waiting, in the bottleneck, can possibly be eliminated by rearranging the conditions, using more equipment, adding more instructors, using peer tutors, or reesigning the procedure. Or, perhaps the bottleneck cannot be eliminated. Then, it might be possible to use the time wasted in the bottleneck for other productive purposes. Perhaps the physical space can be used for individuals to begin orientation to subsequent instruction, or perhaps they can be assigned other required duties. A specific solution is hard to predict, but the process involves locating the problem and then generating a number of possible solutions until one is found that most closely solves the problem. Sometimes it is useful to seek opinions from others who are unfamiliar with the specific situation and who can ask "naive" questions such as: "Why do you have them do that?" "Why do they do this before that?" Being required to answer these questions may turn up alternatives not previously considered.

Since there are rarely obvious and easy solutions to such problems, it may be necessary to redesign the segments of instruction that currently take the most time. Since people tend to think in complete units: full days, weeks, months; it is often possible to find parts of days, weeks or even months which are not fully used. If it normally takes four and a half days to do a part of the instruction, it is usually difficult to begin a new unit on Friday afternoon. Finding ways to save these formerly unused segments of time can make a worthwhile reduction in the time required to complete the instruction.

If none of these procedures produces the desired results, it may be necessary to redesign larger segments of instruction. This could require changes in the media, the management system, the testing procedures, and other factors. Development of different testing procedures is possible if there is sufficient need to do so, but such development takes time and requires collecting a great deal of data. Past history has indicated, however, that the possible time savings are quite high.

Virtually all of these methods apply most directly to instruction that is modularized and self-paced. Block scheduled, televised, or platform-instructed courses present another kind of problem. It is normally not possible to have the instructor talk faster or to play the television tapes at a high rate of speed. While much instruction is presented in a block-scheduled manner, it unfortunately is the most difficult kind of instruction to shorten without eliminating subject matter. That is, it is the most difficult to shorten if the management plan and delivery system are to remain the same. If the method of delivering the instruction can be changed, all of the potential savings inherent

in the alternative delivery system may be realized. Going from group-based instruction to individual-based instruction offers a potential saving in the time required because, as has been mentioned earlier, some students learn faster than others and it is the time of the faster learner that often can be saved and returned to the system. If everyone is scheduled in block-fashion, the faster learners still learn faster, but there is no way to recover this time for use elsewhere.

2.2.4 Considerations in Attempting to Improve Instructional Effectiveness

One of the findings in the INER may be that the instruction is not effective; it does not meet the planned objectives. If the EXER indicates a moderately inadequate level of training of graduates, there is a need to locate specifics in the EXER and, if possible, track these through to the INER. If graduates cannot perform tasks 3, 5, and 8 on the job, and if there has been difficulty teaching these tasks at the school, you need to begin analysis with these three tasks. Troubleshoot the course through the use of ISD logic.

To begin, assume that the EXER is correct: The graduates really cannot perform.

Unless the graduates <u>failed</u> the test, it can be assumed it is at least part of the problem. No matter how bad the instruction, if the posttest works properly, it will not permit students to graduate if they are not trained.

One of the following could be wrong with the posttest.

1. The test lacks validity. It does not separate those students who can do the work from those who cannot.

2. The test is so specific that students can learn how to pass the test because they learn from re-taking the test. They can pass the test on specifics, but cannot generalize the knowledge.

Until this problem with the posttest is resolved, there is no point in doing additional work on the instruction. Specifically, careful study of the outputs of Blocks I.3, II.2, and the testing procedures in IV.2 should be examined. There is a good chance that reviewing these testing procedures will lead to a solution of the problem since these data indicate how the test worked under actual field conditions.

Once the test has been revised, it should be used instead of the first version, with enough students to find out whether it is working.

Next, reexamine the EXER. Were all graduates inadequate, or just some fraction of them? If there were some satisfactory graduates and some unsatisfactory ones, and if the posttest had a numerical score, find out whether those who scored highest on the posttest were found to be satisfactory graduates. If so, the battle is half won. If not, continue to use the revised posttest until there are enough graduates in the field to do another follow-up.

If there is not a validated JPM to use as a means of measuring job performance, the problem is more difficult. Without the JPM, there are only supervisors' ratings and other soft data that normally are not highly reliable. That is, two qualified supervisors will not give the graduate the same performance rating. If supervisors cannot agree on who the satisfactory graduates are, it is very hard to train students

to meet these varied expectations. Much faith will have to be placed in the external evaluator's judgement. He will interview, collect data, and make recommendations for revisions based on the data and on his impressions. But, no one will be able to say for sure whether the changes will result in a more acceptable graduate. It will be a trial and error process.

Many factors will determine the course of action taken if there are no validated JPMs. If the school environment has a high degree of fidelity with the job world, the development of JPMs may be the necessary first step. Follow the procedures in Block I.3. Remember that high fidelity instruction in school is more likely on those tasks in technical, clerical, administrative, and certain operator skills where the actual equipment is available at the school.

For certain DOSs, high fidelity with the job will be difficult to achieve, e.g., Hospital Corpsman, Infantryman, and a revision approach may have to be based on an agreement between the schools and the using commands. If representatives of the schools and using commands agree on a task list and level of proficiency for graduates, the revision can start at that point. These meetings and discussions may be the best way to resolve differences, particularly where the notion that the school should produce a totally trained person can be discussed.

Further, discussions based on data and interviews could lead to discoveries that tasks have been changed or that supervisors did not understand the objectives of the course. In these cases, a much better common ground of agreement can be established.

The EXER could also have shown that student graduates believed they were overtrained for the job while supervisors believed they were undertrained. If students were trained to do tasks they were never allowed or asked to do, and not trained on some tasks expected of them, such a discrepancy could exist. This discrepancy might have to be tolerated since an entire course cannot be revised based on that kind of data. However, if virtually all using commands and trainees are consistently in agreement on those questions and on which tasks were not required, revision would be in order. It would also mean an inadequate task analysis had been conducted.

2.3 Prepare Revision Plan

The preparation of a revision plan involves the analysis of the evaluation data on a block-by-block and step-by-step basis. A revision plan format is presented in Figure V.16. The purpose of the revision plan is to identify the problems in each step of the process and to indicate the intended action to be taken to eliminate the discrepancies. The plan should include clear statements of the problem to be solved and the time and resources required to meet the goals.

In order to gain inputs and alternatives from those most familiar with the processes, the revision plan is then discussed with each of the people whose work will be affected by it. It may be that a revision plan

REVISION PLAN FORMAT

1. Course identification information.
2. Training requirements being met by the course. Number of students being trained, over what periods of time, to what degree of proficiency, in what DOS.
3. Present costs of meeting training requirements. Instructional personnel requirements, facilities, equipment, time, etc. Estimated costs of any on-the-job training due to inadequacy of present program.
4. Why course revision is recommended.
   a. Based on INER?
   b. Based on EXER?
   c. Based on changes to job structure?
   d. Based on potential savings of time or money?
5. Specific details of deficiency in present course.
6. Specifically what changes are recommended.
   a. What is rationale for specific recommendations?
   b. What are costs of revision?
   c. Time schedule for revisions.
   d. Impact of revisions on presently operating course.
   e. Personnel requirements for revision.
7. Estimated costs of meeting training requirements with revised course.
8. Alternative plans considered and reasons for rejection.
9. Projected furure requirements for course.
10. Probable results if course is not revised.

FIGURE V.16: Revision Plan Format

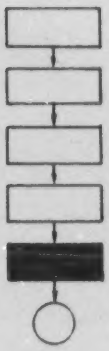
cannot be adequately prepared without prior consultation with the specialists in the various steps in the process.

One important point here is that emphasis should be placed on reaching agreement between the schools and the using commands based on sound job analyses and a clear statement of command needs. The fewer the assumptions made about what the using commands need and the more direct the communication, the more likely will be acceptance of the graduates when they arrive after training.

The revision plan should contain a good estimate of the implications that making the revisions will have on other on-going work. Course revisions must fit into the work priority schedule just as any other work must fit. The more carefully the plan is made, the better the decisions about priorities can be made.

The kinds of improvements that are planned should be clearly stated. Decreasing time by applying what specific methods? Increasing the proportion of students passing the tests on the first attempt may be possible, but there must be reason to believe that the proposed improvements will actually make a difference that outweighs the costs. The benefits of the improvements can be estimated, as well as the penalties for not making the improvements. This information can be used to make decisions about where to allocate training resources to do the most good for the total training system, not for just one unit of instruction.

2.4 Perform Follow-Up Activity



Once the determination is made to revise the system, personnel must be assigned responsibility for the various revision steps. Generally, the individuals responsible for each of the steps in the ISD process will undertake the required revision effort.

If the revision plan requires only a simple change in administration or a test or a part of the instruction, revision may be as simple as using the revised part again and evaluating the results. However, if the first item in the revision plan is to conduct job analysis, and if this new job analysis results in a task list that is different from the original task list, all the blocks in the ISD Model will have to be followed. However, fortunately, if the ISD process was followed when the instruction being revised was originally developed, much valuable information will be available to assist in the revision effort.

In Block V.1, CONDUCT INTERNAL EVALUATION, progress evaluation and process evaluation were discussed. The information given there is a good set of guidelines for following-up on the system revision activity.

3.0 OUTPUTS

The outputs of this block should consist of the following:

3.1 Products

A complete revision plan following the general format given in Figure V.16 (page 113) of this block.

3.2 Other Documentation

Follow-up information including the following:

1. Revision progress vs. revision plan
2. Reasons for any deviation from the plan
3. Specific results of each major step in the revision plan

EXAMPLE

Sample Revision Plan for a Course in OH-58 Helicopter Repair--

1. Course identification information:

   A. Trains students to perform user support level maintenance of the OH-58 helicopter airframe, power plant, hydraulic systems, instruments, electrical system, turbine engine maintenance and change, rotor systems, power train system, flight controls, inspections, and avionics.

2. Training requirements:

   A. The course produces 90 OH-58 Helicopter Repairmen each 8 weeks, all qualified to perform the above support level user maintenance under supervision. This excludes inspection and avionics, each of which must be supplemented with two weeks of FOJT.

3. Present costs of meeting training requirements:

   A. The course required 8 instructors, 8 support personnel, administrative office space for 8, instructors' offices for 8, 2 classrooms seating 100, and one maintenance area containing 8 OH-58 helicopters.

   B. .....

4. Reason for course revision recommendation:

   A. Recommendations based on INER.

      1) Revise units #2 and #5: Within-course posttest scores below standard.
      2) .....

   B. Recommendations based on EXER.

      1) Revise safety instruction: Accident rate has increased 9%.
      2) .....

5. Specific details of deficiency in present course:

   A. Consistently low student performance on unit #2 indicated a need for revision. Analysis of the instruction in unit #2 indicates that the topics must be broken down into smaller units of skill and information.

   B. .....

6. Specific changes recommended:

   A. Unit #2:

      1) Unit on installation of main transmission thermoswitch will be subdivided into three separate sub-units:

         a) Inspect main transmission thermoswitch
         b) Install main transmission thermoswitch
         c) Procure main transmission thermoswitch

   B. .....

7. Estimated costs of meeting training requirements:

   A. Equipment costs:

      1) 100 general mechanics tool kits @ $35.00 per kit--$3,500
      2) .....

   B. .....

8. Alternate plans considered and reasons for rejection:

   A. The proposal to move training on the airframe, flight controls, and instruments to FOJT was rejected. These systems are interdependent with several other major systems and cannot be ignored during formal school training. Only inspection and avionics represent independent topics. They will be trained through FOJT.

9. Projected future requirements of the course:

   A. The department of the Army Headquarters does not anticipate an increased need for OH-58 Helicopter Repairmen during the next 24 months.

   B. .....

10. Probable results if course is not revised:

    A. Failure to revise training unit #2 will result in continued inadequate job performance.

    B. .....

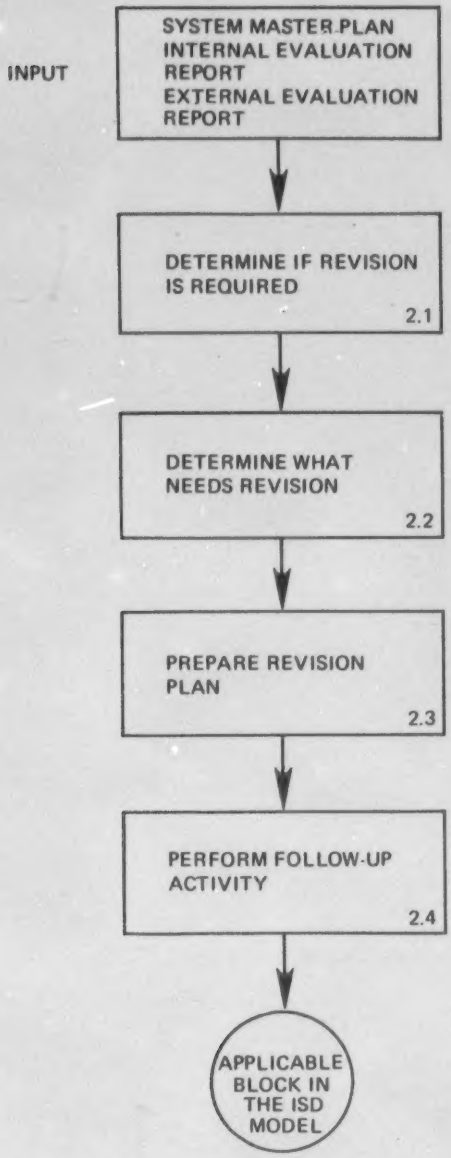


FIGURE V.12: Flowchart of Block V.3: REVISE SYSTEM

REFERENCES

REFERENCES

PHASE V

Block V.1

Department of the Air Force. Handbook for designers of instructional systems: Evaluation (Vol. V, AFP 50-58). Washington D.C.: Headquarters, United States Air Force, July 1974.

This fifth volume in the Air Force's series of pamphlets on instructional design is devoted to evaluation of training programs. To provide for evaluation of the instructional system, the last step in the Air Force Model, an evaluation plan is prepared. Under this plan, the evaluation plan is conducted by personnel who are not involved in planning or conducting the training. This plan specifies both internal and field evaluation.

Kaufman, R. A.. Educational system planning. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972.

One of the elements of the systems approach to instructional design that distinguishes it from other approaches is the evaluation-revision cycle. The use of this cycle allows the designer to develop a "self-correcting" mechanism whereby instructional products are revised until they meet specific performance criteria as identified in the objective.

Swezey, R. W., and Pearlstein, R. B. Developing criterion-referenced tests. Reston, Va.: Applied Science Associates, 1974.

The development of pretests, posttests and the testing plan is a requisite component in the data collection stage of process evaluation. To be effective indicators of the outcomes of instruction it is necessary to construct criterion-referred tests which measure a trainee's ability to perform a specific task at a specific level of performance.

Thorndike, E. L. (Ed.). Educational measurement. Washington: American Council on Education, 1971.

Educational evaluation seeks to produce data of various sorts which can be used for the purpose of educational decision-making and ultimately the improvement and refinement of specific instructional products. One helpful article in this collection is "The Evaluation of Educational Programs" by A. W. Astin and R. J. Panos. In this article, the inputs, outputs, and operations of an evaluative study are reviewed in regard to their relative importance to the decision making process.

Tracy, W. R. Designing training and development systems. New York: American Management Association, Inc.

The purpose of conducting an internal evaluation is to collect data and information in order to improve the training system. If the evaluation is to be valid, all components of an instructional system must be analyzed: instructors, trainees, instructional materials, strategies, facilities etc.

REFERENCES

PHASE V

Block V.2

Kaufman, R. A. Educational system planning. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972.

The systems approach requires members of the instructional design team to become proficient in the tools of assessment and evaluation. A systems approach to instructional design is noted for its constant evaluation and revision until instruction is effective in realizing its goal of efficiently trained men being successful on the job.

Swezey, R. W., & Pearlstein, R. B. Developing criterion-referenced tests. Reston, Va.: Applied Science Associates, 1974.

A criterion-referenced test measures an individual's performance compared to some external criteria or performance standard. As such, it can be used to evaluate the effectiveness of an instructional program designed to train students on specific tasks which are critical to the trainee's success when he enters the field.

Thorndike, E. L. (Ed.). Educational measurement. Washington, D.C.: American Council on Education, 1971.

Thorndike's collection of articles on measurement offers several articles on evaluation. One useful article is "Performance and Product Evaluation" by Robert Fitzpatrick and Edward Morrison.

In performance and product evaluation, some criterion situation such as vocational (job performance) capabilities are assessed. A "work sample" test evaluates some component of a trainee's on-the-job performance after training has been completed.

Tracy, W. R. Designing training and development systems. New York: American Management Association, Inc.

The ultimate test of any instructional system is the trainees' ability to perform successfully on the job. The external evaluation or follow-up of a training program is concerned with an evaluation of the products of the training program. The external evaluation collects data pertaining to the quality of the job performances of the trainees. Tracey devotes a chapter to evaluating training systems.

Tracey, W. R., Flynn, E. B., & Legere, C. L. J. The development of instructional systems procedures manual. Fort Devens, Mass.: United States Army Security Agency, 1970.

Conclusive proof of the adequacy of an instructional system can be obtained only by follow-up and evaluation of trainees on the job. Methods of evaluation are discussed in several chapters of this document, along with suggestions for conducting the evaluation.

REFERENCES

PHASE V

Block V.3

Kaufman, R. A. Educational system planning. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1972.

The results of evaluation may yield data indicating that the course output is not meeting the intended course goals. The revision process or quality control refers to any systematically planned change of the instructional system. To ensure system responsiveness it is necessary to carry out a planned revision when such a need is apparent.

Short, J. G., Geear, L. G., Haughey, B. E., & Tien, D. T. Strategies of training development: Final report of a project to develop a fundamentals course (AIR-E-97-2/68-FR). Pittsburgh, Pa.: American Institutes for Research, February 1968.

A course was designed to teach electronics troubleshooting skills. The course was developed in a series of gradual approximations of the final version of the course. Through successive revisions based on trainee on-the-job performance a uniformly high level of performance was reached by all trainees. The results of this project provide good evidence of what careful, systematic revision can accomplish.

GLOSSARY

ACRONYMS

AFS - Air Force Speciality

AR - Army Regulations

CMI - Computer Managed Instruction

CRT - Criterion Referenced Test

CODAP - Comprehensive Occupational Data Analysis Programs

DOS - Defense Occupational Specialities

FM - Field Manuals

FOJT - Formal On The Job Training

GED - General Educational Development

HQ - Headquarters

ISD - Instructional Systems Development

ISS - Installation Support School

ITV - Instructional Television

JPA - Job Performance Aids

JPM - Job Performance Measure

KOR - Knowledge of Results

LO - Learning Objective

LS - Learning Step

MODB - Military Occupational Data Bank

MOS - Military Occupational Specialities (Army/Marine Corps)

MWO - Modification Work Orders

NIH - Not Invented Here

NOTAP - Naval Occupational Task Analysis Program

OJT - On The Job Training

OSR - Occupational Survey Report

POI - Program of Instruction

QQPRI - Qualitative and Quantitative Personnel Requirements Identification

RS - Resident School

SME - Subject Matter Expert

SMP - System Master Plan

SOP - Standing Operation Procedures, Standard Operating Procedures

STEP - Self-Teaching Exportable Package

TAK - Trainer Appraisal Kit

TI - Traditional Instruction

GLOSSARY

ABILITY GROUPING: Arrangement whereby students are assigned to groups on the basis of aptitude testing.

ABSOLUTE STANDARDS: A statement defining the exact level of performance required of a student as a demonstration that he has mastered the course objective(s). Criterion-referenced tests are usually based on an absolute standard.

ACHIEVEMENT GROUPING: Arrangement whereby students are assigned to groups according to their performance on pretests of units of the course.

ACTION: Occurs in terminal learning objectives and learning objectives; describes the specific behavior the learner is to exhibit after training.

ACTION VERBS: Verbs that convey action and reflect the type of learning that is to occur. Action verbs must reflect behaviors that are measureable, observable, verifiable, and reliable.

ACTIVITY STEP: One simple operation or movement that comprises part of a job. A job performance standard consists of a list of these operations or movements.

ADJUNCT PROGRAMMING: A method of combining the features of good existing instructional materials (e.g., films, textbooks) with special directions or questions to guide the learner.

ADMINISTRATIVE CRITERIA: In media selection, the options that courseware be developed locally or at some central location.

ALGORITHM: A rule or procedure for accomplishing a task or solving a problem.

ALPHANUMERIC: Refers to a combination of letters and numbers; for example, on the keyboard of a teletype.

ALTERNATE PATH: Refers to elements which have relationships in which the specific situation encountered determines the appropriate sequence, or it may be another way of meeting the same objective.

TLO - Terminal Learning Objective

TM - Technical Manuals

TOE - Tables of Organization and Equipment

TRADOC - U.S. Training and Doctrine Command

BLOCKING: Refers to the process of defining and illustrating the different camera movements and camera shots in a television or film script. A blocked script may also contain directions as to the movement of actors as well as scenery changes.

CHECKLIST: Job performance aid which lists the elements of a task in the sequence of execution. The job holder places a check beside each element as it is accomplished, thus insuring that the task is completed.

CHRONOLOGICAL ORDER: Arranging content in order from one topic to another based on when they occurred in time.

COMMON-FACTOR LEARNING OBJECTIVES: Refers to learning objectives that are identical, or that have identical action words and similar objects of the action in the learning objective statement.

COMPARATIVE SEQUENCE: Sequencing which starts with familiar topics and goes to unfamiliar ones.

COMPLEXITY CRITERION: In media selection, the degree of complexity required of instructional materials in order to adequately train students to meet learning objectives.

COMPUTER MODELS TECHNIQUE: Occurs during the simulation of an operational system; involves having a computer simulate the major operations of the system, under a variety of conditions.

CONDITIONS: Occurs in terminal learning objectives; describes what is presented to the student in order to accomplish the specified action, that is, it describes the important aspects of the performance environment.

CONTIGUITY: Refers, in learning, to the principle that events which occur closely together become associated by the learner.

CONTINGENCY MANAGEMENT: The establishment of a set of procedures by which trainees are required to perform a certain amount of work or to achieve certain objectives before engaging in activities that are preferred by the trainee (e.g., recreation, a break, or a more desirable training event).

ASSESSMENT: A judgment of the effectiveness and efficiency of a training system, in terms of measurement and evaluation.

ASSOCIATION DEVICES: Memory aids, techniques which ease recall. Mnemonic devices.

ATTITUDE: A persisting state of a person that influences his choice of action.

ATTITUDE MEASURE: An instrument designed to gather information about how people feel toward a particular object. This could include liking or disliking subject matter, usefulness of a medium, or opinions about the medium.

AUDIO-ONLY PROGRAM: A production which does not contain any video or pictures; for example, a record or radio program.

AUDIO PRODUCER: Prepares tape recordings and produces audio programs. The audio producer combines narration, music, and other sound effects in the production of an audio program.

AUDIOVISUAL MEDIA: Refers to any device such as television or film which is both seen and heard.

BASELINE DATA: Valid and reliable information about the current level of performance of the intended student population. This data can be used to confirm the need to develop new instruction, or can be used as a comparison in ascertaining differences between students' performance before and after instruction.

BEHAVIORAL ATTRIBUTES: Qualities or activities that characterize an object or process. Behavioral attributes characterize each category of learning.

BLOCK SCHEDULING: Mode of instruction whereby all students receive the same instruction at the same time.

DECISION TREE: Flowchart; graphic representation of the sequence of a specific activity or operation.

DELIVERY SYSTEM: Any method containing plans and procedures for the presentation of instruction. Platform instruction, television, FOJT, and STEPs are all delivery systems.

DEPENDENT RELATIONSHIP: Occurs when skills and knowledges in one learning objective are closely related to those in the other learning objective. In order to master one of the learning objectives, it is first necessary to learn the other.

DOWNTIME: Refers to the period of time when equipment is inoperable.

DUTY: One of the major subdivisions of work performed by one individual. One or more duties constitute a job.

DUTY TITLE: Categorizes groups of tasks under identifiable headings to help in the organizing of lists of tasks.

EMPIRICALLY BASED REVISION: Revision based on the results of test data and the collection of other types of quantitative information.

ENTRY BEHAVIOR: The skill, knowledge, and/or attitude required before beginning a new segment of instruction; also may refer to the capability a person has prior to new learning.

ENTRY SKILLS: Specific, measurable behaviors that have been determined through the process of analysis of learning requirements to be basic to subsequent knowledge or skill in the course.

ENTRY SKILLS TEST: A measurement instrument designed to determine if a student already possesses certain skills or knowledge needed as a prerequisite before undertaking new instruction.

ENTRY TEST: Contains items based on the objectives that the intended students must have mastered in order to begin the course.

COURSE DOCUMENTATION: Information describing the current content of a course (instructional materials, tests, instructor's manual, evaluation plan, student's manual) and its developmental history (job analysis, criteria for selecting tasks for training, previous revisions).

CLUSTERING: A process of organizing many tasks into groups for the purpose of deciding upon the optimal instructional setting mix for that group of tasks.

CRITERION-REFERENCED TEST: Measures what an individual can do or knows, compared to what he must be able to do or must know in order to successfully perform a task. Here an individual's performance is compared to external criteria or performance standards which are derived from an analysis of what is required to do a particular task.

CRITICAL CUE: Cue which must be correctly interpreted by the student before we can correctly perform the associated task.

CRITICAL SEQUENCE: Sequencing of topics or objectives according to their importance.

CUE: A word or other signal that initiates or guides behavior; a prompt.

CUT-OFF SCORE. Minimum passing score.

DATA: Collection of facts or numerical values resulting from observations of situations, objects, or people.

DATA COLLECTION PLAN: An outline of the procedures and techniques that will be used to gather information for any specific purpose.

DATA RECORDING PLAN: Method of tabulating background responses and test data.

DECAY RATE: The amount of time it takes a trainee to forget what he has learned in school. If the decay rate is high then a trainee should not receive instruction in a specific task until shortly before he will actually perform it.

FOJT--FORMAL ON-THE-JOB TRAINING: This type of training takes place in the actual work situation.

FOLLOW-UP ACTIVITIES: The work events that occur after a course of instruction has been completed.

FORMATIVE EVALUATION: The iterative process of developing and improving instructional materials and procedures.

FIDELITY: Refers to how well the actions, conditions, cues, and standards of the JPM approximate those of the task.

FIELD USER NEEDS: The general and specific duties that will have to be taught to the trainee if he is to be able to adequately perform in a real world environment.

FIRST DRAFT MATERIALS: Any materials (book, film, etc.) which are not yet committed to their final form. First draft refers to the fact that the materials are still in 'rough' form and will be revised on the basis of test results and other data.

FLOWCHART: A graphic representation of the sequence of a specific activity or operation; decision tree.

FRONT END ANALYSIS: Refers to job analysis, selection of tasks for training, and development of JPMs.

FIXED SEQUENCE: Refers to elements that are always done in the same order.

GRAPHIC ARTIST: Designs and prepares a wide variety of visual illustrations such as graphs, charts, and diagrams.

GRAPHIC SCALE: Measurement device which includes some type of number line on which students indicate their attitude toward a social object.

GO NO-GO: Pass-fail; criterion of evaluation whereby student cannot be "partially correct". He is either 100% correct (go) or incorrect (no-go).

ERROR OF HALO: Occurs when an observer sometimes allows his rating of performance to be influenced by his general impression of a person.

ERRORS OF LOGIC: Occur when two or more traits are being rated. It is present if an observer tends to give similar ratings to traits which do not necessarily go together. The traits are related only in the mind of the person making the error.

ERRORS OF STANDARD: Occur when observers tend to rate performers too high or too low because of differences in their standards.

EVALUATION: The process of interpreting the results of measurement data (e.g., tests, JPMs) for the purpose of making a judgment or decision on the instruction or on the success of a trainee.

EVALUATION CRITERIA: The measures used to determine the adequacy of performance.

EVALUATION PLAN: A method or outline of what set of procedures will be used to gather data and information for the purpose of assessing a course of instruction.

EXTERNAL CUES: Signals for action that exist outside of the student (conditions, features, or characteristics of the job environment that trigger action).

FALSE NEGATIVE: Occurs when a person can perform the task but receives a failing score on the test.

FALSE POSITIVE: Occurs when a person cannot perform the task but receives a passing score on the test.

FEEDBACK: The return of information. Information on student performance is "fed" back to the student so that he can improve that performance; to the instructional designer so that he can improve materials and procedures on the basis of student needs; to the management system so it can monitor the internal and external integrity of the instruction and make appropriate revisions. Or, refers to the flow of data or information from one step in the ISD Model to others.

INSTRUCTIONAL MANAGEMENT PLAN: The specifications for the scheduling, instruction and evaluation of trainees toward the goal of course completion.

INSTRUCTIONAL PROGRAM: The development of various materials (books, audiovisual productions, etc.) designed to achieve a specific training goal.

INSTRUCTIONAL SETTING: The vehicle through which a trainee who initially is not able to perform a task becomes proficient in performing the task; for example, performance aids, self-teaching exportable packages, formal on-job training, installation support schools, and resident schools.

INSTRUCTIONAL SUPPORT: Learning resources; different kinds of material, number of instructors, amount of time, etc. which will contribute to the learning situation.

INSTRUCTIONAL SYSTEM: The total effort, distinct from the operating system by location, authority, or mission, that is concerned with the preparation of individuals to serve the operating system.

INTERNAL CUES: Internal biological signals that initiate or guide behavior.

INTERNAL EVALUATION: Assessment of the effectiveness of an instructional program in terms of student performance on stated terminal learning objectives.

JOB: The duties and tasks performed by a single worker constitute his job. If identical duties and tasks are performed by several individuals, they all hold the same job. The job is the basic unit used in carrying out the personnel actions of selection, training, classification, and assignment.

JOB ANALYSIS: The basic method used to obtain a detailed listings of duites, tasks, and elements necessary to perform a clearly defined, specific job, involving observations of workers and conversations with those who know the job, in order to describe in detail the work involved, including conditions and standards.

GROUP MANAGEMENT PLAN: Arrangement whereby instruction is scheduled and conducted for groups instead of individuals.

GROUP TRAINING: A group of people gathered together for the purpose of receiving information or instruction in the performance of some specific task.

HARD DATA: A direct and precise measure of a specific performance. A JPM is an example of hard data while an attitude questionnaire is a less direct measure, providing soft data.

HIGH DENSITY SIGNAL: A signal containing many cues. A low density signal contains few cues.

INDEPENDENT RELATIONSHIP: Occurs when skills and knowledges in one objective are unrelated to those in the other objective. Mastering one of the objectives does not simplify the other.

INDICATOR BEHAVIOR: Refers to that behavior that indicates the presence of a specific attitude.

INDIVIDUALIZED INSTRUCTION: Refers, in the ISD Model, to a management scheme which permits individual characteristics of trainees to be a major determinant of the kind and amount of instruction given. Here, it nearly always implies some form of self-pacing.

INSTALLATION SUPPORT SCHOOLS: Organized and operated by individual units or commands to meet local training requirements.

INSTRUCTIONAL CONDITIONS: The amount of participation which the instruction requires of the learner. Instructional conditions may be active (the learner produces or practices) or passive (the learner sits and listens).

INSTRUCTIONAL DESIGNER: Person who designs and develops a program or course of studies based on a systematic analysis.

INFORMATION: Knowledge; the facts, names, labels, and larger bodies of knowledge that are necessary for successful job performance.

LEARNING GUIDELINES: Statements which specify the learning events and activities appropriate to specific instruction. Learning guidelines combine to form learning sub-categories.

LEARNING HIERARCHY: Graphically portrays the relationships among learning tasks in which some tasks must be mastered before others can be learned.

LEARNING OBJECTIVE: Describes precisely what is to be learned in terms of the expected student performance under specified conditions to accepted standards. These learning objectives identify the mental skills, information, attitudes, or physical skills that are required to perform the terminal learning objective.

LEARNING RESOURCE CENTER: Library containing instructional materials and areas for viewing and study.

LEARNING STEP: Occurs when learning objectives are broken down into smaller parts.

LEARNING SUB-CATEGORY: A division of a learning category.

LEARNING TASK ANALYSIS: Procedure used in the domain of intellectual skills to identify prerequisite tasks that must be learned before a person can learn a given task.

LINK TRAINER: Mechanical training device which simulates the cockpit of an aircraft.

RESPONSE BIAS: Tendency to favor a certain response over others.

MANAGEMENT PLAN: Program for the assignment, monitoring, and assessment of the personnel, materials, and resources dedicated to a specific mission, operation, or function.

MASTERY: In terms of learning, refers to meeting all of the specified minimum requirements for a specific performance. Criteria for mastery are defined in the design phase of the ISD Model.

JOB FIDELITY: The degree to which a testing situation truthfully and accurately reflects the job situation.

JOB PERFORMANCE MEASURES: Tests that are used to evaluate proficiency of a job holder on each task he performs.

JOB PERFORMANCE TEST: Test used to determine whether or how well an individual can perform a job. In may include either all of the job performance measures for a particular job or a subset of the job performance measures.

JPA--JOB PERFORMANCE AID: A checklist, instruction sheet, or other device that offers a possible alternative to training rather than an actual method of training; they are developed to eliminate or minimize training requirements for some tasks.

KNOWLEDGE OF RESULTS: Feedback; information provided to the student indicating the correctness of his response. Evaluative knowledge of results indicates what a student is doing right and what he is doing wrong. Comparative knowledge of results indicates how the student's response compares to the objective or standard established by the instructor.

LEARNER CHARACTERICTICS: The traits possessed by learners that could affect their ability to learn (e.g., age, I.Q., reading level, etc.).

LEARNING ACTIVITY: The specific behaviors a student performs during a particular episode of learning.

LEARNING ANALYSIS: A procedure to identify subelements that must be learned before a person can achieve mastery of the performance.

LEARNING CATEGORY: A division of learning behavior. All learning may be classified into one of four learning categories: mental skill, physical skill, information, or attitude.

LEARNING EVENT: The immediate outcome of a learning activity.

MNEMONICS: Methods which make information easier to remember; memory aids.

MODE OF INSTRUCTION: Method of scheduling materials presentation. The instructional mode may be individualized (self-pacing) or group (block scheduling).

MODULE: An individualized self-instructional package usually containing all the necessary materials a learner needs to meet some or part of a terminal learning objective.

MULTIMEDIA PACKAGE: Self-contained instructional unit in more than one medium.

NARRATION: Is the voice overheard on an audiovisual program.

NARRATOR: Is the person whose voice is heard describing or commenting upon the content of a film, television program, etc.

NUMERICAL SCALE: Measurement device which associates verbal descriptions of social objects with numbers and requires students to indicate their attitudes by marking the appropriate number.

OBSERVATION INTERVIEW: Job holder is observed in the job environment performing all or a substantial part of the job; the job holder performs the job while the analyst ask questions.

OFF-LINE: Refers to any activity which does not take place as part of the regular production process.

OVERLEARNING: Refers to the continual practice on a learning task by a person who has correctly performed the task.

PEER TUTORING: A form of instruction in which students at the same or more advanced level of knowledge provide instruction to students at the same or lower level of knowledge on the specific objectives under consideration. Peer tutors are not members of the existing instructional establishment.

MEAN: Arithmetic average calculated by adding up all scores and dividing by the number of scores.

MEASUREMENT: Consists of rules for assigning numbers to objects to represent quantities of attributes.

MEASUREMENT ERRORS: Incorrect procedures carried out during the measurement process which invalidate the results. These errors result from unfounded assumtions made by judges or raters.

MEASUREMENT PROCESS: The operations involved in determining the amount of an attribute (e.g., skill, knowledge, or attitude) possessed by a student.

MEDIA: Means for presenting instructional material to learners; for example, books, audiotapes, and filmstrips.

MEDIA ALTERNATIVE: A form of instructional material that contains the stimulus criteria required by a specific learning activity.

MEDIA MIX: Combination of different media used to present a unit of instruction.

MEDIA POOL: All of the media options suitable for a given unit of instruction. The final media choice is drawn from the media pool.

MEDIA SELECTION: Is the major means of determining how instruction is to be packaged and presented to the student.

MENTAL SET: A preparatory mental adjustment, or readiness, for a particular type of experience.

MENTAL SKILLS: Those processes of identifying, classifying, using rules, and solving problems that involve active mental processing. Mental skills imply the capability of applying the learning to some situation and demonstrating the mental skill, such as thinking, creating, and analyzing.

PROCESS STANDARDS: Refers to the conditions which must be satisfied for a job to be successfully completed. Process standards refer to sequence, accuracy, speed of performance, and completeness.

PROGRAMMED INSTRUCTION: Instructional materials which present subject matter in a series of small sequential units which require responses from the student.

PROMPT: A word or other signal that initiates or guides behavior; a cue.

QUALITY CONTROL: Process of measuring and evaluating in order to maintain course standards through adjustments in instructional materials or procedures.

QUALITY CONTROL DATA: Information which reflects the degree of success achieved by a system or operation.

RANDOM SELECTION: Choosing people or objects at random rather than according to some systematic plan.

RANK ORDER: The assignment of ranks to students. This could refer to groups, such as the top 10%, or simply listing each student from highest to lowest. Rank ordering is appropriate when there is a need to select the fastest, the most accurate, or the best producer.

RATING ERRORS: Errors of standards, ratio, and logic.

RATING SCALE: A measurement device in which a student must choose a response from a range of choices arranged in a continuum from low to high or good to bad, etc.

REGULATIONS: Rules for appropriate conduct and behavior.

RELIABILITY: The consistency with which a test measures the amount of student achievement.

RESIDENT SCHOOLS: These schools are designed to meet service-wide training requirements.

PERFORMANCE EVALUATION: The gathering of data to specifically determine the success of students on a specific task, as a result of a training program.

PERFORMANCE MEASURES: The absolute standard by which a job performance is judged. A performance measure is the inventory of job tasks with each performance objective.

PERSE ERATE: Continue an activity until it is completed, regardless of the difficulty, or the appropriateness of the solution technique to the problem.

PERT--PROGRAM EVALUATION REVIEW TECHNIQUE: PERT is a method of monitoring the flow of a large project by breaking it down into small individual activities and assigning each activity a specified amount of time for completion.

PHYSICAL SKILLS: Specified muscular activities for accomplishing a goal.

POST FEEDBACK DELAY: The pause which follows the presentation of feedback. This allows time for the correct response to "sink in."

POSTTEST: A test administered after the completion of instruction to assess whether a student has mastered the objectives of the course or unit.

PREDICTIVE VALIDITY: The ability of a test score to accurately forecast future performance.

PREDIFFERENTIATION OF STIMULI: Pointing out the distinguishing features of an object and explaining the differences between them.

PRETEST: Administered prior to instruction to determine how much the student already knows.

PROCESS EVALUATION: An early stage in ISD development that identifies which steps in the model will be used for the course under development. The purpose of the process evaluation is to describe and document the actual developmental process for this particular instruction.

SIMULATION: Any change from reality or any imitation of reality. Three types are common: simulating part of the system, simulating the operation of the system, and simulating the environment in which the system will operate.

SIMULATORS: Machines or processes designed to provide training which will have high positive transfer to the real world equipment or situation. Simulators are ordinarily cheaper, safer, or more available than the actual situation or equipment.

SLIDE-TAPE: A combination of visual slides and an audio tape synchronized so that the audio describes the content of the slides.

SOFT DATA: Obtained from attitude or opinion surveys. This data is not as reliable as hard data.

STANDARDS: Occurs in terminal learning objectives or learning objectives; describes the criterion or standard of performance which must be attained.

STIMULUS CRITERIA: Those basic qualities or capabilities of a medium that are required to carry out the intent of the learning activity; for example, visual images, motion, color, and sound.

STORYBOARD: A collection or series of small pictures which describe the action and content that will be contained in an audio-visual or visual-only production. A sequence of these small pictures comprise a storyboard.

SUBJECT MATTER EXPERT: A person who has professional skill in the performance of some job and who is consulted by an instructional designer in the process of job task analysis.

SUPPORTIVE RELATIONSHIP: Occurs when skills and knowledges in one objective have some relationship to those in the other objective; the learning involved in mastery of one learning objective transfers to the other, making learning involved in the mastery of the other easier.

REVISION PLAN: A detailed outline of the procedures to be taken to modify the structure or content of a course.

REWARD SEQUENCE: Scheduling the more pleasant activity to follow the less pleasant activity; can be used to provide a reward for completion.

SAMPLE: A portion or small segment of the students for whom instruction is designed.

SAMPLING PLAN: Procedure for selecting a small but representative group from a larger population.

SCALE: In media selection, some materials must represent actual objects and accurately represent the dimensions of those objects. A model may, for example, be full scale, half scale, or on a 1 to 10 scale with the actual object.

SELF PACING: Mode of instruction whereby each student works through the instructional materials at his own rate of speed.

SELF-PACED MANAGEMENT PLAN: Arrangement whereby instruction is scheduled and conducted for individual students rather than groups of students.

SELF-TEACHING EXPORTABLE PACKAGES: Self instructional study units; generally sent to the student wherever he is stationed.

SEQUENCING: Ordering instruction; proper sequencing allows the learner to make the transition from one skill or body of knowledge to another, and assures that supporting skills and knowledge are acquired before dependent performances are introduced.

SHAPING: Gradually changing a student's behavior until it is correct.

SIGNAL: Cue that initiates and directs activity.

TASK STATEMENT: A statement of highly specific action which has a verb and object; for example, sort mail.

TECHNICAL ORDERS: Military regulations which deal with the specific nature of technical materials and equipment.

TERMINAL LEARNING OBJECTIVE: Derived from job performance measures, TLOs are to be attained during training. TLOs are broken down into their component parts which are documented as learning objectives which may be further divided into learning steps. Each TLO contains actions, conditions, and standards.

TESTS: Any device or technique used to measure the performance of a student on a specific task or subject matter.

TESTING CONSTRAINTS: Limitations such as time, money, personnel, facilities, and other resources, which prohibit job performance measures from being identical to the tasks they measure.

TRADE-OFFS: In any systematic approach to instruction, it is necessary to make compromises between what is desirable and what is possible. Ordinarily, these decisions involve increases or decreases in time, money, facilities, equipment, or personnel. Training aids and simulators represent examples of trade-offs.

TRAINER APPRAISAL KIT: A package of instructional materials designed to provide a course instructor with practice in the preparation, presentation, and validation of instruction.

TRAINING: The teaching of job skills. It can take a number of forms such as self-teaching exportable packages, training manuals, individual learning packages, FOJT, or group training.

TRAINING SETTING CRITERIA: In media selection, the options that training must be either small group, large group, individualized at a fixed location, or individualized independent of location.

SYMBOL: Anything that stands for or represents something else. A plus sign (+) is a symbol for the mathematical operation of addition.

SYSTEM MASTER PLAN: Control document used to coordinate the development and implementation of an instructional program.

SYNCHRONIZING PULSE: An audible or inaudible sound used to coordinate the audio and video portions of a slide-tape program so that audio and video (i.e., slide and narration) are coordinated.

SYSTEMS APPROACH: A generic term referring to the orderly process of analysis, design, development, evaluation, revision, and operation of a collection of interrelated elements.

TALK-THROUGH TECHNIQUE: Occurs during the simulation of an operational system; involves talking through each operation in the new system to determine decisions and contingencies.

TARGET POPULATION: The pool of potential entrants to training for which instructional materials are designed and tried out.

TASK DELAY TOLERANCE: A measure of how much delay can be tolerated between the time the need for task performance becomes evident and the time actual performance must begin.

TASK: Formed in clusters which make up duties. A task is the lowest level of behavior in a job that describes the performance of a meaningful function in the job under consideration.

TASK INVENTORY: List that itemizes all of the tasks that make up a selected duty.

TASK LEARNING DIFFICULTY: Refers to time, effort, and assistance required by a student to achieve performance proficiency.

TASK STANDARD. A statement of how well a task must be performed.

TRYOUT: Practice test; the purpose is to make the tryout as realistic as possible by eliminating as many sources of unreliability as possible.

UNDERTRAIN: Provide inadequate training that does not prepare a student to meet regular job performance requirements.

VALIDATION: A process through which a course is revised until it is effective in realizing its instructional goal.

VALIDATION DOCUMENTATION: A report which describes in detail how a specific course of instruction was validated and for what target population.

VALIDATION PROCESS: Testing instructional materials on a sample of the target population to insure that the materials are effective.

VALIDITY: The degree to which a test measures what it claims to measure.

VALUE ENGINEERING: Refers to the process of designing equipment or instruction to meet but not exceed the required outcomes. Ordinarily, it refers to the elimination of features or instructional objectives that have not been demonstrated to be positively necessary.

VIGILANCE LEVEL: General degree of watchfulness or attentiveness to what may come.

VISUAL FORM: In media selection, refers to whether alphanumeric or pictorial characteristics are required in a learning situation.

VISUAL SPECTRUM: The type of color required of instructional materials. Some must be with full color, others may be with black and white or shades of grey.

WITHIN-COURSE TESTS: Administered during a course of instruction to assure that all students are "keeping up" with the learning objectives.

WORK ELEMENTS: The element is the smallest component in the structure of a job. Elements combine to form a task, tasks combine to form a duty, and duties combine to form a job.

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